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BRITISH AND FOREIGN.

EDITED BY

JAMES BRITTEN, K.S.G., F.L.S.,

SENIOR ASSISTANT, DEPARTMENT OF BOTANY, BRITISH MUSEUM (NATURAL HISTORY).

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British and Foreign

EDITED BY

JAMES BRITTEN, K.S.G., F.L.S.,

Senior Assistant, Department of Botany, British Museum (Natural History).

The Journal of Botany was established in 1863 by Dr. Seemann. In 1872 the editorship was assumed by the late Dr. Trimen, who, assisted during part of the time by Mr. J. G. Baker and Mr. Spencer Moore, carried it on until the end of 1879, when he left England for Ceylon. Since then it has been in the hands of the present Editor.

Without professing to occupy the vast field of general Botany, the Journal has from its inception filled a position which, even now, is covered by no other periodical. It affords a ready and prompt medium for the publication of new discoveries, and appears regularly and punctually on the 1st of each month. While more especially concerned with systematic botany, observations of every kind are welcomed. Especial prominence has from the first been given to British botany, and it may safely be said that nothing of primary importance bearing upon this subject has remained unnoticed.

Bibliographical matters have also received and continue to receive considerable attention, and the history of many obscure publications has been elucidated. Every number contains reviews of new and important books written by competent critics: in this as in every other respect a strictly independent attitude has been maintained. While in no way officially connected with the Department of Botany of the British Museum, the Journal has from the first been controlled by those whose acquaintance with the National Herbarium has enabled them to utilize its pages for recording facts of interest and importance regarding the priceless botanical collections which the Museum contains. Many important monographs and other works first appeared in its pages. In 1896 it became necessary to increase its size, owing to the number of papers sent for publication: the number of plates was at the same time augmented.

Subscriptions and advertisements should be sent to West, Newman & Co., 54 Hatton Garden, London, not later than the 24th of each month: communications for publication and books for review to The Editor, 126 Kennington Park Road, S.E.

The volumes for 1884 to 1895 can still be had, price 14s. each, or £7 10s. the set. Of vols. 1884 and 1885 very few copies remain.

The bound volumes for 1896, 1897, 1898, and 1899 can be had at the usual price, £1 1s. each; also covers for the 1899 volume (price 1s. 4d. post free).

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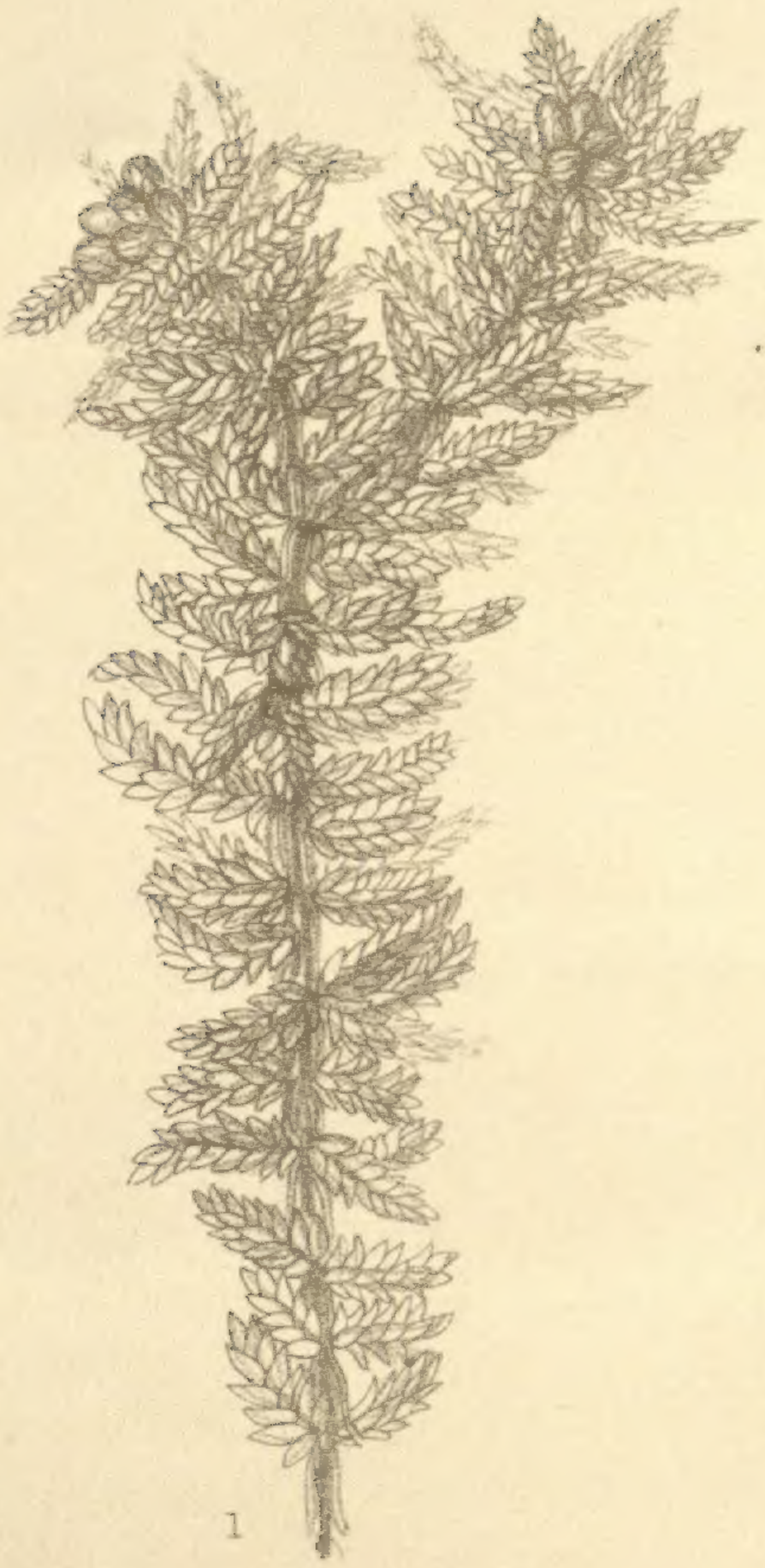

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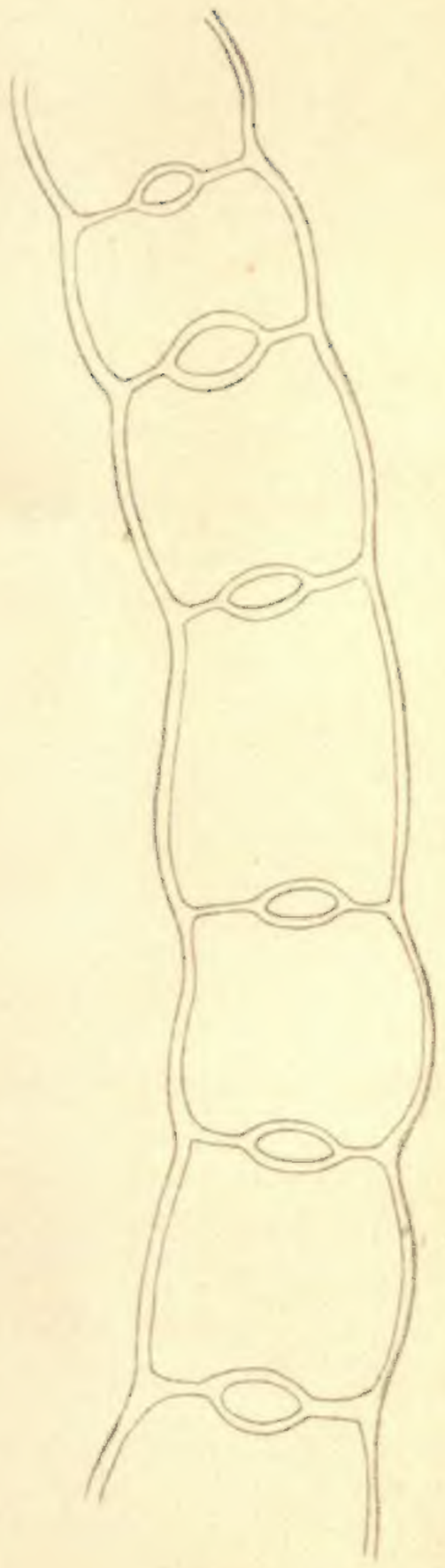

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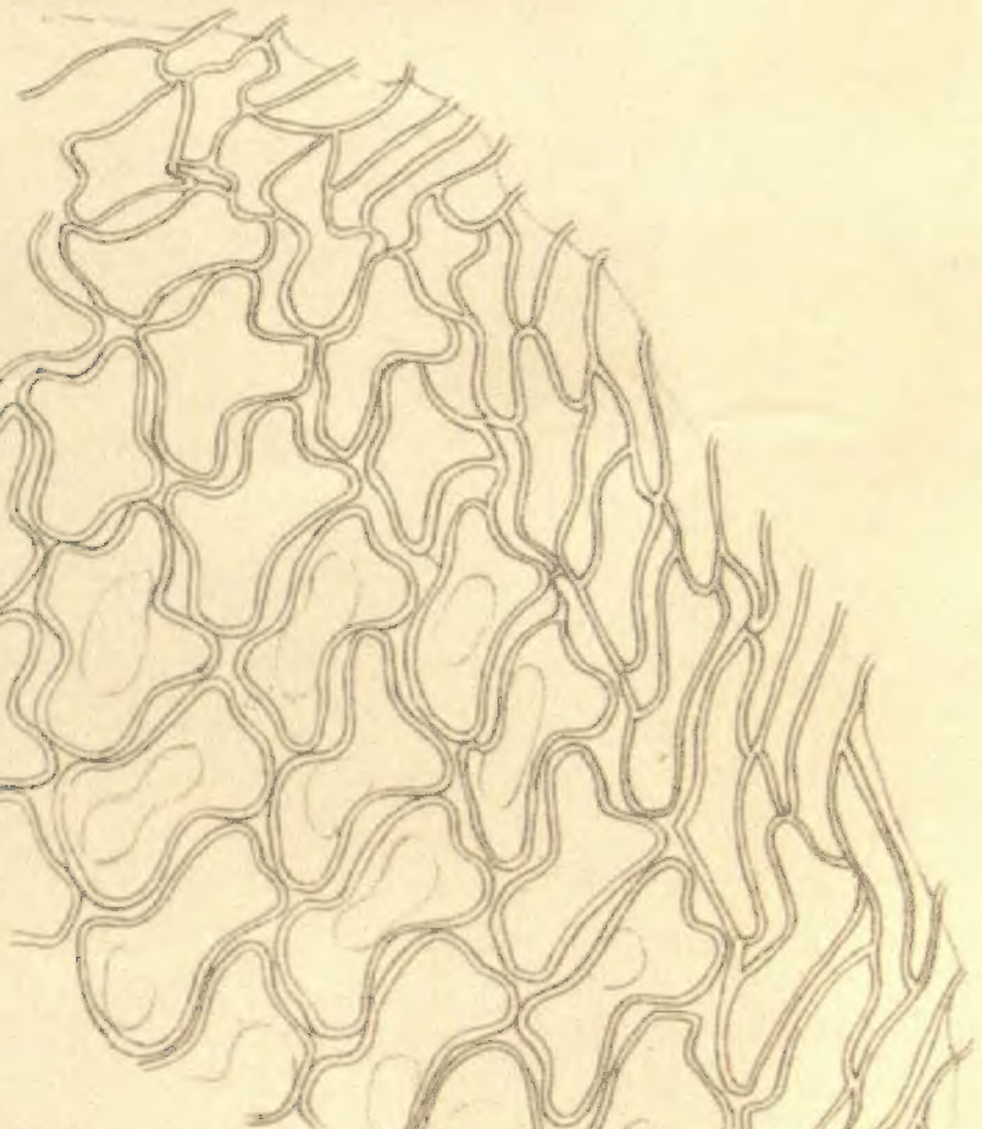

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Sphagnum medium *Limpr.*

THE

JOURNAL OF BOTANY

BRITISH AND FOREIGN.

SPHAGNUM MEDIUM Limpr. IN BRITAIN.

By Harold W. Monington, F.L.S.

(Plate 405.)

While recently looking through some Sphagna gathered by Mr. E. C. Horrell last August in Teesdale, I was much struck with the beauty of a plant clearly referable to *Sphagnum medium* Limpr., and, as this fine bog-moss is apparently little known in this country, I have felt justified in making a few remarks upon its history, and in giving a short description supplemented by a plate.

S. medium has been long known as the purple form of *S. cymbifolium*, the var. *purpurascens* of Russow, but the identity of this plant with Limpricht's species appears to have escaped notice. It has been frequently gathered and is generally distributed throughout these islands. The first record seems to be that from Witherslack Moss, Westmoreland, specimens from which, gathered by Barnes in 1872, were issued in Braithwaite's Sphagn. Brit. Exsicc. as *S. cymbifolium* var. *purpurascens* Russ. To Mr. Stabler belongs the credit of first recognizing *S. medium* as a British species, it being included in his "Hepaticæ and Musci of Westmoreland" (*Naturalist*, 1898, 124).

S. cymbifolium var. *β congestum* was described by Schimper in 1858 (Entw.-Gesch. d. Torfm. 69) as follows: "dense cæspitosum, cæspites rufo- et viridi-variegati vel pallide rufo-rubelli." I have not yet been able to examine Schimper's specimens of this variety, but I can see in the above description little more than a rather denser form than usual of the type, and nothing to exclude the forms of the var. *purpurascens*. This was distinguished by Russow in 1865 (Beitr. z. Kenntn. d. Torfm. 78), thus: "*β purpurascens*, Astbüschel sehr genähert; abstehende Aeste kurz, dick spindelförmig, aufwarts strebend. Meist in tiefen Mooren mit *Sph. acutifolium* var. *purpureum*, doch an nicht sehr feuchten stellen, äusserst dichte, kuppenförmige, und der Oberfläche dunkel bläulich rothe, seltener grün und rothe, im unteren Theile stark gebleichte, meist schmutzig gelbe Rasen bildend."

Dr. Braithwaite's *Sphagnaceæ of Europe and North America* appeared in 1880, and included both Bridel's var. *compactum*

and the var. *purpurascens* Russ. under var. *β congestum* Schp. This is referred to (p. 41) as occurring in two forms: one "in extremely dense cushions of large size," the other "laxer and of a more rosy tint above and pale below, very conspicuous by the abundant heads of deep purple male inflorescence." The former is apparently the plant distributed in the Exsiccata as the var. "*congestum*"; the latter agrees with the var. "*purpurascens*," specimens of which Dr. Braithwaite has kindly sent me. Of the specimens sent out as the latter all are probably *S. medium*, but some at least of the var. *congestum* are truly referable to *S. cymbifolium*.

Limpricht, in Bot. Centralbl. 1881, 313, followed Braithwaite in combining these varieties, uniting them under an older name of Sendtner's, as *S. medium*, n. sp., mainly upon the strength of the important character of the enclosed chlorophyllose cells. A full and detailed description subsequently appeared in the same author's *Laubmoose*.

Warnstorf gives an excellent description of *S. medium* in the *Botanical Gazette*, 1890, 252–4, from which I quote the following:—

"Dioicous; male branchlets purple. Size and habit of *S. cymbifolium*, but with the tufts *variegated*, dappled with green and red to violet-purple, often only the male amentula faintly suffused with red: rarely pure green or white. Branches not more than four, of which two are spreading, strong thick-fusiform, horizontal or ascending, often curved, obtuse, more rarely short-pointed. Wood cylinder *purple or rose-red*, shining through the cortex. Stem-cortex mostly composed of four, rarely of three or five, layers of cells. Stem-leaves as in *S. cymbifolium*. Branch-leaves variously shaped. Chlorophyllose cells in cross-section small, *elliptical*, *central and completely enclosed on both sides by the biplane hyaline cells*."

The claim of *S. medium* to full rank is open to question. Cardot (Bull. Soc. Roy. Bot. de Belgique, xxv. 44 (1886)) says: "Malgré l'importance relative du caractère tiré de la coupe transversale des feuilles raméales, je ne puis voir dans le *S. medium* un type entièrement indépendant du *S. cymbifolium*." He arrives at this conclusion from certain specimens from the Vosges, &c., in which the chlorophyllose cells approach the ventral surface, and the common wall of the contiguous hyaline cells becomes thickened, and accordingly sinks *S. medium* to a subspecies of *S. cymbifolium*.

S. medium, on the other hand, approaches *S. papillosum*, a tropical form, *S. erythrocalyx* Hpe. bearing papillæ. Warnstorf, in the Bot. Gazette (1890), p. 252, included this under *S. medium* on account of the enclosed chlorophyllose cells, *S. medium* thus consisting of both smooth and papillose forms, while *S. papillosum* was reduced to a var. of *S. cymbifolium*. More recently, however (*Hedwigia*, 1894, 330), he restores *S. papillosum*, and promotes *S. erythrocalyx* to specific rank. Our species thus consists of smooth-celled forms only.

Although unquestionably the three species, *S. cymbifolium*, *S. medium*, and *S. papillosum*, are closely related, I am inclined to think *S. medium* a good species. It varies considerably in colour

and degree of variegation, and to some extent in the arrangement of the branch-leaves, but preserves in nearly all cases a facies by which it can be readily detected.

The crucial point is of course the position of the chlorophyllose cells, to ascertain which the section should be cut through the *middle* of the leaf; in many cases, however, careful focussing will reveal the situation of the enclosed cells. In focussing downwards the common wall of adjoining hyaline cells will be noticed before the immersed chlorophyllose cells appear; it is of course necessary to repeat this process upon the other side of the leaf.

So far as my own specimens indicate, the distribution of the species is as follows:—England: Witherslack Moss, Westmoreland (*Barnes*, 1872); Teesdale (*Dr. Mason*); Widdy Bank Fell, Teesdale, Durham (*Horrell*, 1899); Keston, Kent (*Horrell*, 1899). Scotland: Ben More (*Dixon & Binstead*, 1897); Chapelton Moss, Hamilton (*J. Murray*, 1899). Ireland: Geashill, King's Co. (*H. W. Lett*, 1890). Mr. Lett's plant was named "*S. papillosum* var. *confertum*." Mr. Dixon's specimen from Ben More is certainly not the type; probably it is the var. *virescens* W.

Explanation of Plate 405.—Fig. 1. Plant, nat. size (Witherslack Moss). 2. Part of stem, with fascicle. 3. Stem-leaf, × 16. 3*a*. Ditto, apex, × 280. 3*b*. Ditto, cells above middle, × 280. 4. Branch-leaf, × 16. 4*a*. Ditto, cells from middle, × 280. 4*b*. Ditto, transverse section, × 500.

SOME WELSH HAWKWEEDS.

By Rev. Augustin Ley, M.A.

The following descriptions of *Hieracium* forms appertain to plants which I have been able to study for some years, and are published on my own sole responsibility. I have personally had no opportunity of submitting either the plants or the descriptions to continental authorities; and, although I have naturally brought them before one or two of the leading students of this genus in England, and have received suggestions of much value from their kind criticism, corrections or alterations, if found necessary, must entail responsibility on no one but the author of this paper.

1. Hieracium murorum L. ex parte, var. lucidulum, nov. var. Very near to *H. murorum* var. *pellucidum* Laestad., but differing constantly from it in the following particulars:—Stem shorter (about 1 ft.); root-leaves of a fuller, less yellow-green, shining, often purple in exposure, veins less impressed on the upper and far less prominent on the under surface, shortly elliptic or roundly ovate, often deeply cordate and toothed at base, and (except at base) almost entire; spreading horizontally. Heads smaller, on shorter, more spreading peduncles, often forming a somewhat umbellate head; ligules shorter, style darkened. Fresh pappus pure white. Stem with a single leaf, which is ovate-acute, rather long-stalked, often placed low on the stem, or 0.

Mountain rocks and banks, not in the lowlands; common in South Wales. June.

Localities.—Herefordshire: Red Daren and Olchon Daren, in the Hatterel Hills. Monmouthshire: Daren-r-Esgob, Black Mountain. Breconshire: Common on all the mountain rocks, both on the limestone and sandstone; river-side rocks, Glyn Taf-fechan. Carmarthenshire: Cliffs of Llyn-y-fan-fechan; river-side rocks near Llangadoc. Carnarvonshire: Nant Francon. Westmoreland: Ambleside, 1870, *Rev. E. F. Linton*!

Often growing in company with var. *pellucidum* Laestad., but keeping quite distinct from it in the characters noted above. Cultivated along with it for six or seven years, it has retained its characters perfectly. I have endeavoured to indicate its relation to var. *pellucidum* Laestad. in the choice of a varietal name.

Sent out by me through the London Bot. Exchange Club in 1896, from Llangadoc, as var. *pellucidum* Laestad.

Specimens of this plant in Mr. Hanbury's herbarium from several of the above localities have been named var. *pellucidum* Laestad. by Dr. Elfstrand; but, after watching the two for a series of years, I feel sure that they are distinct.

2. H. MURORUM L. ex parte, var. SANGUINEUM, nov. var. Foliage light green, the older root-leaves becoming blood-red underneath. *Stem-leaf 0*, or reduced to a narrow bract. Root-leaves oval or elliptic or long-elliptic, *nearly smooth on both surfaces*, the base emarginate with one or two backward teeth (later leaves on vigorous plants sometimes with conspicuous forward teeth), the two sides of the blade often unequal at base, the margins bearing small teeth which are often reduced to points, the tip similar, or *shortly acuminate in the inner leaves*.

Stem 12–15 in., nearly smooth, *conspicuously* furrowed when dry, branched from above the middle, the main branches straight. Primary flower short-stalked, soon overtopped by the secondaries with curved pedicels. Peduncle and phyllaries setose, the *latter bearing abundant* black-based *greyish hair* and loose tomentum, especially on the conspicuous white margins; tip incurved in bud. Anthode *semiglobose on opening*. Ligules, at least occasionally, ciliate at tip. Style not quite pure yellow.

Standing well away from the type, and from other common varieties of *H. murorum*, in the broad, semiglobose anthode, and the very hairy phyllaries; but agreeing with the type in the incurved tips of the phyllaries in bud, and in the curved pedicels.

The smooth, light-green leaves, with the teeth often obsolete, and the acuminate point are conspicuous features. I have never seen a stem-leaf.

Bot. Exch. Club Reports for 1893 (as *H. cinerascens* Jord.), p. 418, and 1897 (as *H. murorum* var. *caliginosum* Dahl.?), p. 555: where see opinions.

Localities.—Yorkshire: Limestone pavements at Malham Cove, 1888; Smearsett and Moughton Scar, near Settle, 1891; Ingleborough, 1891; all *F. J. Hanbury*! Breconshire: abundant on shaded and exposed limestone rocks at the head of Dyffryn

Crawnon, alt. 1450–1500 ft., 1892 and subsequently; central cliff of the Brecon Beacons, on sandstone.

Under cultivation it has retained its characters unchanged for seven years.

3. **H. vagense,** sp. nov. *H. britannicum* F. J. Hanb. var. *vagense* F. J. Hanb. in Journ. Bot. 1892, 367. As this plant seems acknowledged to be misplaced under *H. britannicum* (see Bot. Exchange Club Report, 1896, p. 523), it seems better to write a short description, giving it rank as a separate species. Its place in our list appears to be near to *H. cæsium* Fr., and perhaps next to *H. cambricum* F. J. Hanb.

Stem *slender*, *drooping*, 1 ft. to 18 in., *light glaucous green*, as is also the foliage, with a single leaf or 0, branching from the middle or at top, with few large heads of flower.

Root-leaves long, narrowly oval or elliptic, *narrowed at base into long petiole*, ascending, upper surface smooth, under strigose with long stiff white hairs, acuminate, the margins bearing *many long acuminate very unequal teeth*, which are often *continued down the petiole nearly to its base*. Stem-leaf similar, or narrower and linear. *Midrib and main veins of all the leaves pellucid*.

Stem with sparse white hairs, tomentose above, branches long, ascending. Peduncles and pedicels bearing setæ which are light-coloured in the living plant. Phyllaries light green, with many setæ and black-based hairs. Bud ovate then oblong, thick; anthode ovate after flowering. Phyllaries at first loosely incurved, *erect in bud*, tips nearly naked. Heads of flower *large*, *handsome*, flat on opening, ligules long. Style yellow. Latter half of June.

Very similar in general appearance to *H. cambricum* F. J. Hanb., but larger in all its parts, more hairy and glandular, less intensely glaucous, and with the leaf-teeth strikingly fringing the petiole.

Growing and increasing by seed readily in garden soil. In cultivation this plant retains all its characteristics, and does not change, except to assume a somewhat larger size, and exaggerate the peculiar toothing of the leaves.

On river-side rocks in the valley of the Wye, between Builth and Three Cocks Junction, chiefly near Errwood, in Breconshire and Radnorshire.

First noticed in 1883: cultivated by me since that date.

4. H. VULGATUM Fr. VAR. MUTABILE, NOV. VAR. Stem 1–2 ft., erect, with 1–4 leaves (usually 2), bearing long stiff white hair on the lower half, slender setæ and tomentum on the upper, the hair lessening upwards, the setæ and tomentum downwards.

Root-leaves several, *spreading horizontally*, long-stalked, elliptic, flat, rather obtuse, narrowed into petiole, greyish green on both sides, with very small shallow teeth. Petiole and both sides of leaf strigose, like base of stem, with stiff white hairs. Stem-leaves similar to the root-leaves, but with less hair, more deeply toothed, and less narrowed into petiole; *1–4, or reduced to 1 or 2 small bracts*, the lowest usually *placed low on the stem*, decreasing in size upwards.

Panicle usually branched, with long ascending branches, the branches 1–3-flowered. Peduncles clothed with sparse white tomentum and black-headed setæ. Phyllaries *without micro-glands*, bearing setæ but scarcely tomentum except at base, acute, some of the *outer ones loose with ascending points*, incurved in bud, with white tips. Buds thick, shortly cylindrical; heads of flower rather small. Style nearly pure yellow.

Best placed as a var. under *H. vulgatum* Fr., this plant nevertheless presents an extraordinary range of variation, which naturally led me, on first studying the wild plant, to suspect a mixture of several species. Further study led me to attribute all the forms to a single species, a conclusion which cultivation has abundantly confirmed. Very small forms with a single stem-leaf from dry mountain banks have become in ordinary garden soil in two years large branching plants 4 ft. high, bearing five stem-leaves and numerous branches. Other forms, simulating *H. murorum* L., when similarly treated, quickly become indistinguishable from these: the plant therefore in this respect presenting a marked contrast to most of the forms in this genus. The hair, under cultivation, becomes less, and the toothing of the stem-leaves exaggerated.

In comparison with *H. sciaphilum* Uechtr., the leafy-stemmed forms of this plant have shorter, more elliptic leaves, those of the root usually arranged in a conspicuous flat rosette, the hair stiffer, the anthode thicker, the hair and floccum of the phyllaries less in quantity, the style nearly pure yellow.

Mountain banks, hedge-banks, railway and colliery *débris*, &c., in mountain districts; common, at least in South Wales.

Localities.—Breconshire: Abundant on the upper part of the Towy and its tributaries (first noticed in 1890); hedge-bank, Llanwrtyd; bank near Abergwesyn (passed by Dr. Lindeberg as *H. rigidum* Hartm. var. *latifolium*); gravel of stream, Cellwen; colliery *débris*, Ystrad-gynlais. Carmarthenshire: Hedge-banks, Nantymwyn; dry mountain banks on the Upper Towy; hedge-bank near Llandebie. Glamorganshire: Bank, Pont-nedd-fechan. Cardiganshire: Mountain banks on the Upper Towy; Cwm Twrch.

Sent to the London Botanical Exchange Club from hedge-banks at Nantymwyn as *H. murorum* L. ex parte, var. *ciliatum* (see *Report*, 1896, p. 523); and from dry mountain banks in the same neighbourhood, without a name (see *Report*, 1897, p. 556).

5. H. VULGATUM Fr. var. AMPLIFOLIUM, nov. var. Tall, stem 2–3 ft., *erect*, sometimes branched from near base; flowers few, rather large; foliage *soft, light green*.

Root-leaves long-stalked, *large*, oblong or oblong-obovate, *rounded and very obtuse*, with very shallow teeth often reduced to mere points, thin, strigose on both sides, with rather stiff white hairs. Stem-leaves 4–5, large, the upper gradually more shortly stalked and smaller, hairy beneath, nearly smooth above, with *large triangular teeth*, acute.

Stem bearing long white hair and setæ, which are rather numerous under and on the base of the phyllaries. Bud shortly

oval, then oblong; anthode after flowering ovate. Phyllaries with many black and few white hairs, light green with darker centre, floccose at tip. Heads of flower flat on opening; ligules *very full yellow;* styles *slightly darkened.*

Near var. *glaucovirens* Dahl., but differing from it in the tall erect habit, closer heads with shorter peduncles, oblong very obtuse root-leaves, soft light and bright green foliage, and darkened style.

From *H. sciaphilum* Uechtr. it is distinguished by its obtuse oblong root-leaves, larger and less numerous stem-leaves, which bear larger triangular teeth, and white-haired peduncles, and by the less numerous and less black setæ of peduncles and phyllaries.

Hilly banks, on limestone and sandstone; also on mountain rocks.

Localities.—Herefordshire: Great Doward Hill; bank at Walford; Red Daren, Hatterel Hills. West Gloucestershire: Symonds Yat. Monmouthshire: Wyndcliff, *Mr. W. A. Shoolbred!* Breconshire: Bwlch-y-fingel, Black Mountain.

THE ADVANTAGES OF 1737 AS A STARTING-POINT OF BOTANICAL NOMENCLATURE.*

By Dr. Otto Kuntze.

At request of the editor of this journal [*Gaertnerisches Zentralblatt*], I give the following newly proved list of generic names, that do not need to be changed if the starting-point of 1735† is abandoned. The numbers before the names are the approximate number of species:—

15 *Aesculus* (*Pavia* 1735).
30 *Ageratum* (*Carelia* 1736).
45 *Ajuga* (*Bulga* 1735).
58 *Arctotis* (*Anemonospermos* 1736).
1400 *Astragalus* (*Tragacantha* 1735) incl.:
150 *Spiesia* = *Oxytropis* according to Briquet and Burnat.
23 *Bulbine* (*Phalangium* 1736).
21 *Carica* (*Papaya* 1735).
8 *Carpesium* (*Conyzoides* 1736).
1 *Cassandra* (*Hydragonum* 1736).
132 *Clitoria* (*Ternatea* 1735).
3 *Coix* (*Sphærium* 1735).
1 *Convallaria* § L. (*Majanthemum* 1736). [§ is the sign for group (section, subgenus or discretionary genus); § L. 1737 means a group of Linnæus.]

* Translated by the author from the *Gaertnerisches Zentralblatt*, Berlin, 1899, No. 2. The article contains a new motive for 1737, and at the last a new international proposition not yet known to English botanists.

† [The date of the first edition of the *Systema Naturæ*.—Ed.]

230 *Cordia* (*Lithocardium* 1735).
6 *Corrigiola* (non 1736).
170 *Crepis* (*Hieraciodes* 1736), if separated.
600 *Croton* (*Oxydectes* 1735).
1 *Cuminum* (non 1735).
180 *Cynanchum* (*Vincetoxicum* 1736) sensu latiore.
1 *Dryas* (*Dryadæa* 1735).
72 *Echinops* (*Sphærocephalus* 1735).
12 *Elatine* (*Potamopithys* 1735).
400 *Erica* Ludw. 1737 (*Ericodes* Möhr. 1736).—*Erica* L. 1737 is partly *Calluna* Salisb. 1802 = *Ericodes* Ludw. 1737 (non Moehr.), Z. T. *Erica* Ludw.—Linnæus' indication "*Semina numerosa*" is only fit for *Erica* Ludw., because *Ericodes vulgare* O.K. (*Calluna vulg.*) has at most 8 seeds.
34 *Erythrina* (*Corallodendron* 1735).
8 *Feuilléea* (non 1735).
5 *Galanthus* (*Chianthemum* 1736).
2 *Galeopsis* (*Ladanum* 1735).
180 *Geranium* § L. 1737; 1753 ex parte max. (*Geraniospermum* Sieg. 1736 = *Pelargonium!* Burm. 1738); eventually incl.
— *Gruinalis* § L. 1737, Ludw. 1737, Haller 1745 (*Geranium* Sieg., L'Hér.).—Linnæus distinguished 1737 (in *Genera Plant.*: 204) under *Geranium* in an observation: *Geranium* "Riv.," corolla irregulari. *Gruinalis* "Riv.," corolla æquali et filamentis vix manifeste coalitis. Haller in *Flora Jenensis* 1745 had under *Gruinalis* only species which we call now *Geranium*. Nearly all species of *Pelargonium* are already named under *Geranium*, and *Geranium* is still a popular name of several nations instead of *Pelargonium*. But it would not be necessary to name the species under *Gruinalis*, because both genera are better united again, as all indicated differences are not decisive, varying from species to species.
90 *Gomphrena* (*Xeræa* 1735).
30 *Helenium* (non 1735).
1 *Illecebrum* (non 1736).
400 *Inga* § L. 1737 (*Feuilléea* 1735) sensu latiore.
90 *Inula* (*Helenium* 1735).
1 *Lagoecia* (*Cuminium* 1735).
100 *Lepidium* (*Nasturtium* 1735).
12 *Linnæa* (*Obolaria* 1736).
1 *Lunularia* (*Marsilia* 1735).
23 *Melilotus* (*Sertula* 1735).
4 *Melia* (*Azedarach* 1735).
13 *Michelia* (non 1735).
156 *Nepeta* (incl. *Glechoma* 1735).
1 *Obolaria* (non 1736).
8 *Ornithopus* (*Ornithopodium* 1735).
2 *Patagonula* (*Patagonica* 1735).
220 *Oxalis* (*Acetosella* 1736).
27 *Phlox* (*Armeria* 1735).

540 *Phyllanthus* (*Diasperus* 1735) sensu latiore.
10 *Pistacia* (*Lentiscus* 1735).
110 *Psidium* (*Guajava* 1736), if separated.
105 *Psoralea* (*Lotodes* 1736).
120 *Rhus* (*Toxicodendron* 1735).
15 *Sesamum* (*Volkameria* 1735).
54 *Sisyrinchium* (*Bermudiana* 1735).
80 *Stapelia* (*Stissera* 1735).
115 *Thesium* (*Linosyris* 1736).
48 *Tropæolum* (*Trophæum* 1735).
75 *Trigonella* (*Telis* 1735).
44 *Trichosanthes* (*Anguina* 1735).
1 *Zea* (*Thalysia* 1735).

6285 species in *58* genera with long-used names remain thus valid. But *329* species in *9* genera, valid from the former starting-point, receive new names; therefore *5956* species in *49* genera are spared, that is, are less to be changed, in their names, if we begin with 1737 instead of 1735. But this is the only profitable deviation from the Paris Code.

Moreover, the starting of 1737 affords the great advantage that Linnæus' *Genera Plantarum* 1737 contains besides the scientific diagnoses of the genera (which are in 1753 without diagnoses!), also definitions for named subgenera or discretionary genera; by which means an easy separation is possible into later distinguished genera. Linnæus wrote, for instance: "*Hyacinthus*, genus hocce naturale in plura non naturalia distribuerunt: (α) *Hyacinthus* quum tubus corollæ sit tubulatus oblongus: (β) *Muscari* quum tubus corollæ sit fere globosus." In the same manner is distinguished *Convallaria* (α) from (β) *Polygonatum*, (γ) *Unifolium*. The last is now mostly valid for *Majanthemum*. In the year 1737 *Myagrum* § L.: *Rapistrum* § L.—is clear, although united under *Myagrum*; in the year 1753, when these sections (§ = subgenera = genera discretionaria) are omitted, we must decide *ex parte majore*, else the matter loses its clearness and becomes confused. The case is the same in *Calendula* and § *Dimorphotheca*, *Helianthemum*, and *Cistus*, etc. The following names are thus obtained from the §§ of 1737 for later renewed genera:—*Acacia*, *Alhagi*, *Arnica****, *Arisarum*, *Bernhardia*, *Bulbocodium**, *Cakile*, *Camara*, *Cannabina**, *Capnodes*, *Capnorchis**, *Castanea***, *Ceratodes*, *Cereus***, *Colocynthis**, *Damasonium*, *Dimorphotheca*, *Dracunculus*, *Echinophora*, *Elephas*, *Fœniculum***, *Helianthemum*, *Helleborodes**, *Hypocystis*, *Ionthlaspi*, *Lontana* § (= *Oftia*), *Lasianthus****, *Leuconymphæa** (= *Nymphæa auct. recent.*;), *Nymphæa* (= *Nuphar*!), *Liliastrum*, *Limonium*, *Majorana*, *Malvaviscus*, *Meibomia**, *Melilotus*, *Melocactus*, *Muscari*, *Nelumbo*, *Myagrum*, *Onobrychis*, *Opuntia*, *Paliurus*, *Polygonatum*, *Raphanistrum*, *Rapistrum*, *Rhagadiolus*, *Securidaca* (*Securigera* DC.), *Statice*, *Symphoricarpus*, *Thymbra**, *Triosteospermum*, *Trollius**, *Tulipifera*, *Unifolium*, *Zacintha***.—(One * means that Linnæus gave such an * to these names in the index of his *Genera Plantarum*; ** means that Linnæus had that name in 1735 for a genus; *** indicates both.)

From these discretionary genera, considered by Linnæus and other authors at one time as genera, at another time as sections, a systematic decision is easy; only two dubious cases occur: the first rare case is that the same group (*a*) received two names, such as *Sida* and *Malvinda*; then the genus name, which received first a species name, is valid. The other case is that three to four names occur for the same now united group; then the name under which they were first correctly united is to be valid. For instance, *Lonicera* 1737 consists of four genera, and is thus confused; Haller, after exclusion of the genera not belonging thereto, first united *Caprifolium*, *Periclymenum*, *Chamæcerasus*, *Xylosteum* under *Caprifolium*. *Lobelia* Pl. is correctly defined as a §, and is therefore to be excluded; the rest was named then at first *Rapuntium*, under which name most of the species are already named in the monograph of Presl. Some genera would have to receive new names, if their name were not secured from the § of 1737—e.g. *Helianthemum*. The name *Cactus*, after exclusion of the §§ of 1737, remains good for the remaining part.

In contrast to these great advantages and savings of the *1737*-starting-point, there are—see my *Revisio Generum III*[II], chapters 27 and 28—to be changed with the *1753*-starting-point the names of *7100* species and *129* genera, whereof only *29* genera with *152* species are named up to the present time. Furthermore, *46* genera thereof with *3621* species would have still to receive new and unusual names, instead of those introduced from the earlier starting-point. But even with this the number of these changes is not finished, because the starting-point of 1753 for genera has not yet been completely worked out. This 1753-starting-point is thus not only horribly *noxious* but also *unscientific*, as it misses the genera-diagnoses and nearly all the named genera-sections. *Only the 1737-starting-point is practicable, scientific, and economical for genera.* Perhaps a general convention may be agreed upon to the effect that the *1737*-starting-point be valid for genera, 1753 for species *with future exclusion of all intermediate works*—that is, of all publications between Linnæus' *Genera Plantarum* 1737 and *Species Plantarum* 1753.

[Dr. Kuntze has shown, as might have been anticipated, that for the starting-point of genera there are great advantages attending the adoption of 1737, the date of Linnæus' first edition of the *Genera Plantarum*, in preference to the *Systema* of 1735. The Paris Laws of Botanical Nomenclature (1867), art. 15, would have seemed to sanction the use of the names in the publication of 1735, had not they generally been bare names without descriptions or characters, and therefore barred by art. 46.

Dr. Kuntze's concluding proposal is remarkable and arbitrary, and doubtless to many minds will appear unfair as well as inconsistent with sound principles. It is to the effect that, after taking Linnæus' *Genera Plantarum* of 1737 for the starting-point of genera and the *Species Plantarum* of 1753 for that of species, all publications between these dates be in future for ever excluded. It is difficult to see why, if 1737 be made the starting-point, the *Corollarium Generum*

Plantarum of Linnæus, published in 1737, subsequently to the *Genera Plantarum*, should be ignored, as well as such important publications as Linnæus' second edition of the *Genera Plantarum* (1742) and the second and sixth editions of the *Systema Naturæ* (1740 and 1748), and all the works of contemporaneous authors.

The Berlin Code of 1897 makes 1753/54 the starting-point for the names of genera as well as species; and the general tendency of modern botanists is now and for some time has been towards agreement to this rule—that is, to take the publication of the first volume of the *Species Plantarum* as the earliest authoritative publication for the names of plants. Such an epoch is essentially convenient and proper, and fairly scientific; the species there are comprehensively for the first time on the Linnean plan both named, classified, and described. Their names of course are not limited to the trivial portion, but necessarily include also the generic portion, and thus the names of his genera can be understood, though they are not as such specially defined or characterized, the only sort of description being involved in that of their respective species. The 1752 and 1754 editions of the *Genera Plantarum* are available as informal or further assistance to clear up doubts about the meaning of the generic names. Moreover, it may be urged that, in dealing with the genera of such an early period of systematic knowledge, when plants were grouped in genera after a fashion often very different from what now prevails, and when short definitions were considered sufficient, it is much more instructive and satisfactory to know precisely what species an author included in his genus than to be able only to rely on the characters which he ascribed to it. In general a species may be regarded as a natural entity in a greater degree than a genus can be, and in a much greater degree than many of Linnæus' genera; and, although in some cases his species are made up of a mixture of quite different plants, in the great majority of cases no doubt need exist as to the genus (as now understood) to which his species belonged, and thus by means of the *Species Plantarum* it is possible to understand the significance of his genera in a clearer manner than can be deduced from his *Genera Plantarum*.

Dr. Kuntze, in the second part (1898) of the third volume of his *Revisio Generum Plantarum*, chapters 27 and 28, has shown that a large number of names will require change if 1753 is taken as the starting-point, which need not be altered if 1737 is taken; but his figures deserve careful scrutiny, and some of the principles and details which he assumes for the purpose of his calculations must be duly weighed before acceptance. Of the numerous specific names which he has given in the *Revisio* in accordance with his present or previous principles, comparatively few have obtained general use, and science will not greatly suffer if, in accordance with modern or better principles, many of them must now be given up, and others or new ones substituted. On the whole, it may be conceded that 1737 is a preferable starting-point to 1735, but it remains probable that 1753 will be decided to be the best, the most convenient, and sufficiently scientific.—Ed. Journ. Bot.]

ON SOME SPECIES OF CRACCA.

By James Britten, F.L.S., and Edmund G. Baker, F.L.S.

I. Cracca virginiana L.

An incidental reference to the National Herbarium in connection with the plant known to modern American authors until lately as *Tephrosia virginiana* Pers., and to the more modern school as *Cracca virginiana* L., showed that by this name were represented in literature and in herbaria two plants so unlike in appearance and in character that it is at first impossible to imagine that they could have been confused. This, however, is the case, and the explanation is rendered more difficult by the fact that the confusion was caused by Linnæus himself, the founder of the species. The name, however, is, and for a hundred and fifty years has been, misapplied; and this it is our object to show.

The following is the description of *Cracca virginiana* as it stands in Sp. Pl. 752 (1753): the citations are numbered for convenience of reference:—

[1] "Cracca (*virginiana*) leguminibus retrofalcatis compressis villosis spicatis, calycibus lanatis, foliolis ovali-oblongis acuminatis. *Gen. nov.* 1090.

[2] Clitoria foliis pinnatis, caule decumbente. *Hort. cliff.* 498.* *Gron. virg.* 83.

[3] Elymus *Mich. gen.* 210.

[4] Orobus virginianus, foliis fulva lanugine incanis, foliorum nervo in spicam abeunte. *Pluk. mant.* 142.

[5] Cicer astragaloides virginianus hirsutie pubescens, floribus amplis subrubentibus. *Pluk. alm.* 103. *t.* 23. *f.* 2.

Habitat in Virginia, Canada.

Caulis *in loco natali erectus est.*"

[1] The description with the above synonymy (excluding No. 5) appears in Nov. Plant. Genera, pp. 31, 32, n. 1040 (1751), as the first species in the genus *Cracca*, though without trivial name. It is reprinted, with the addition of the specific name, in Amœn. Acad. iii. 18, 19 (1756). In both places, as in the above quotation, "*Elymus* Mitch.* gen. 210" is incorrectly quoted as a synonym—apparently through some accidental confusion with *Erebinthus* Mitch. (on the same page), which, however, is also cited by Linnæus in all three places after the generic name *Cracca*. The mistake is corrected in Sp. Pl. ed. 2, 1063, where *Erebinthus* is correctly cited; there is also in the Banksian herbarium a specimen from Mitchell labelled "Erebinthus Mitchell."

[2] The citation of the descriptive phrase from Hort. Cliff. and Gronovius, standing, as it does, first among the synonyms, is in itself sufficient to determine what plant Linnæus had in mind. In

* The misprint "Mich." is confined to Sp. Pl. ed. 1. *Elymus* Mitch. is correctly cited in Sp. Pl. ed. 2, p. 1408, as a synonym of *Zizania*.

Hort. Cliff. there is a very full description drawn up from a plant raised from Virginian seeds, so that the synonym quoted from Burmann, and belonging to an Indian plant, may be neglected. It will be noted that the reference to Hort. Cliff. is followed by an asterisk, which, in the preface to Sp. Pl. ed. 2, is thus explained: "Descriptiones * tantum in obscuris adhibere necessum fuit, easque sine ambagibus, ut obtinerem compendium tironibus gratum." This sentence appears indeed in Sp. Pl. ed. 1, but the asterisk is omitted, probably through a blunder of the typographer. The sentence is not easy to understand, but the suggestion offered by Mr. Hiern in a note which we transcribe gives the meaning of the *, and is confirmed by further examination of the references in Sp. Pl. to which it is attached. Mr. Hiern writes:—"I have examined the text of *Galega* spp. nn. 3–8, pp. 1062, 1063 in ed. ii, corresponding to *Cracca* spp., p. 752 in ed. i, and it appears to me that the * *following* the references there signifies that useful descriptions are to be found in the works thus referred to. The * follows the reference to Hort. Cliff. and four out of the five references to Fl. Zeyl.; and in each of these places useful descriptions occur, whereas in the fifth reference to Fl. Zeyl. a shorter and less satisfactory description is given; there is not a * to the six references to Amœn. Acad. 3, where the descriptions are useless; there is a * following the reference under *Galega cinerea* L. Sp. Pl. ed. 2, p. 1062, to Amœn. Acad. 5, where the description is useful."

[3] Mitchell's plant has already been dealt with under [1].

[4] We cannot speak positively about this plant, for the determination of which no material appears to exist; so far as the description goes, there is no reason why it should not represent the species intended in the preceding references. Even if, however, we regard this as doubtful, the descriptions and type specimens of the three preceding plants leave no doubt as to their identity with the *Cracca virginiana* of Sp. Pl. 752.

[5] The plant figured by Plukenet in his *Almagestum*, the types of which are preserved in his herbarium (Herb. Sloane xciii. f. 100, cii, 166), was accepted by Solander as *Galega virginiana* Linnæus—a name substituted in Sp. Pl. ed. 2, 1062, for the *Cracca virginiana* of ed. 1, and has been regarded as such by all American authors down to the most recent monographers, but is an entirely different species. The identification of this plant with the true *C. virginiana* is no doubt due to the general acceptance of Plukenet's figure, which is comparatively easy of access, as the Linnean type; and the specimen in the Linnean herbarium, written up in his own hand, undoubtedly represents the same species. This specimen he received from Kalm, and on its authority it would seem that the locality "Canada" and the note "caulis in loco natali erectus est" were added in Sp. Pl. to the original account in *Nova Genera*; the inclusion of these details explains the introduction of the reference to Plukenet's *Almagestum*, which represents the same plant, and from which all the subsequent confusion has arisen. It is important to note that Gronovius rightly distinguished the two

Plukenet plants, as is shown by his descriptions and specimens, and by the labels attached to the latter. De Candolle, too (Prodr. ii. 250), under *Tephrosia virginiana* Pers., cites "*Galega virginiana* Linn. Spec. 1062, non hort. Cliff.," showing that the discrepancy between the two descriptions had not escaped him. Solander also observed the difference between the plants, and the following note in his MSS. shows that he was misled by the Plukenet figure: having cited the specimens in the Sloane Herbarium from Maryland (Jezreel Jones, Vernon, and Krieg) and Carolina (Catesby), he writes: "Secundum differentiam specificam legumina esset retrofalcata, sed in speciminibus e Carolina missis legumina fuere recta compressa. An distincta planta? sed assimilatur figuræ Plukenetianæ."

It will, we think, be apparent from what has been said that the foundation of *Cracca virginiana* L. is the description published (without trivial name) in Nov. Gen. Pl. (1751), and repeated (with trivial) in Amœn. Acad. in 1756; the synonymy here cited includes the plants of Hort. Cliff., Gronovius, and Mitchell, of each of which, as has been said, the types exist. These types and descriptions refer, not to the plant now universally known as *Cracca* (or *Tephrosia*) *virginiana*, but to *Cracca spicata* O. K. (*T. spicata* Torr. & Gray)—a name which must give place to *C. virginiana*.

The history of the plant will be best shown by the following synonymy, in which references are given to the principal works in which the true *Cracca virginiana* of Linnæus has been entered under various names. From this it will be seen that the right use of *virginiana* ceased with Willdenow in 1800, since which time *Galega spicata* of Walter, under various synonyms, has been accepted as the type of the plant; it was transferred to *Tephrosia* by Torrey and Gray, and subsequently to *Cracca* by Dr. Kuntze, who has been followed in this by later American authors. The plant is so distinct from the false *virginiana* that the synonymy adduced is not open to doubt; we follow Miss Vail and others in placing here the obscure *T. hispida* DC. Dr. Robinson's adoption of the name *T. villosa* Pers. for the plant seems to require a special note.

In this adoption Dr. Robinson has been singularly unfortunate. He says (Bot. Gaz. 1899, 199, footnote):—"The name *T. villosa* is first employed by Persoon in his *Synopsis* (1807), and is there used exclusively for the American plant. . . . The usage of De Candolle and many more recent European writers, by which the name *T. villosa* is applied to an East Indian and African species, to which Persoon's description had no reference whatever, is clearly an unwarrantable transposition. It is true that there was an earlier *Galega villosa* than that of Michaux, but this should not invalidate *Tephrosia villosa* Pers., which is clearly applied to the American plant, and is antedated by no homonym. The plant of the Old World, although possessing an earlier specific name, was not brought under *Tephrosia* until later, and, it is believed, should in that genus receive another specific designation."

Dr. Robinson's remarks are based on his very natural assump-

tion that Persoon had only one *Tephrosia villosa*. As a matter of fact, he has two—nos. 17 and 23—on the same page; the former based on *Galega villosa* of Michaux, the latter on *G. villosa* Linn. It is fortunate that those American botanists who regard the earlier precedence of a name on the page of a book as a claim to priority are in this case prevented from restoring *T. villosa*, no. 17, by their rule as to the adoption of the earliest specific designation. *T. villosa* Pers. will therefore remain attached to the Old World plant.

Cracca virginiana L.

Orobus virginianus, etc., Pluk. Mant. 142 (1700); Ray Hist. iii. 450 (1704).

Clitoria foliis pinnatis, etc., Linn. Hort. Cliff. 498 (1737) et in herb. Cliffort.!; Gronov. Fl. Virg. 83 (1743) et herb.! (Clayton, no. 102).

Erebinthus Mitch. in Act. Nat. Cur. viii. App. 210 (1748) et in herb. Banks!

Cracca leguminibus retrofalcatis, etc., Linn. Nov. Pl. Gen. pp. 31, 32, no. 1090 (1751), Sp. Pl. n. 1, cum synon.; Gronov. Fl. Virgin. ed. 2, 111 (1762), cum syn.

Cracca virginiana L. Sp. Pl. 752 (1753), cum synon. (excl. syn. Cicer astragaloides, etc.; Pluk. Alm. 103); Amœn. Acad. iii. 18, 19 (1756), cum synonymis.

Galega virginiana L. Sp. Pl. ed. 2, 1062 (1763) (excl. syn. Pluk. Alm.); Willd. Sp. Pl. iii. 1244 (1800) (excl. syn. Pluk. Alm.).

Galega spicata Walt. Fl. Carol. 188 (1788) et herb.!

Galega villosa Michx. Fl. Bor. Amer. ii. 67 (1803).

Tephrosia villosa Pers. Syn. ii. 329, no. 17, non no. 23, (1807); Robinson in Bot. Gaz. 1899, p. 199.

Tephrosia paucifolia Nutt. Gen. ii. 119 (1818) et herb.! (*pauciflora*); Elliott Bot. S. Carol. ii. 246 (1824); DC. Prodr. ii. 252 (1825).

Tephrosia hispida DC. Prodr. ii. 250 (1825).

Galega paucifolia Nutt. ex M. A. Curtis in Bost. Journ. Nat. Hist. i. 122 (1837).*

Tephrosia spicata Torr. & Gray, Fl. N. Amer. i. 296 (1838); Chapman, Fl. S. United States, 95 (1860); S. Wats. Bibl. Index, 260 (1878).

Tephrosia mollissima Bert. Bot. Misc. ix. 10, t. 3, fig. 2 (1851).

Cracca spicata O. Kuntze, Rev. Gen. i. 175 (1891); Vail in Bull. Torr. Bot. Club, 1895, 30; Britton & Brown, Ill. Fl. N. Amer. ii. 293 (1897), cum ic.

II. Cracca holosericea.

The identity of *Cracca virginiana* L. having been established, it becomes a question what the plant so designated in recent American books is to be called. The only name we can find for this, so completely has its identity been lost sight of, is *Tephrosia holosericea* Nuttall, which was proposed by him as a species in 1834, and was

* Cited as of Curtis by Miss Vail and Dr. Robinson, but the context shows that the "N" after the name = Nuttall.

subsequently reduced by Torrey and Gray to a variety of the plant they called *T. virginiana*. Nuttall's specimens in the National Herbarium show no characters which separate the plant from the false *virginiana*, of which Nuttall himself at first considered it a variety; and no one now regards it as specifically distinct. Nuttall says of it:—"Nearly related to *T. virginica*, but with leaflets more numerous and approximating, and with the whole plant sericeous, scarcely excepting the upper surfaces of the leaves." Our series of specimens shows almost every intermediate in clothing between this and the var. *glabra* of Torrey and Gray, and we propose to adopt Nuttall's name for the species; those who consider the more common and less silky form worthy of varietal distinction will doubtless find for it a suitable name.

The synonymy of the plant is as follows:—

Cracca holosericea.

Cicer Astragaloides (fortè) *Virginianum*, hirsutè pubescens, floribus amplis, subrubentibus, *Phytogr.* Tab. 23, fig. 2. Pluk. Almagest. p. 103 (1696) et in Herb. Sloane, xciii. 100! cii. 166! Raii Hist. iii. 451 (1704).

Vicia foliis pinnatis abruptis Gronov. Fl. Virgin. 83 (1743), ed. 2, 106 (1762) et herb.! (Clayton, no. 38) cum syn.

Cracca virginiana L. Sp. Pl. 752 (1753) quoad syn. Pluk. Almag. (supra citat.) et in Herb.!; O. Kuntze, Rev. Gen. i. 173 (1891); MacMill. Metasperm. 328 (1892); Vail in Bull. Torr. Bot. Club, 1895, 27; Britton & Brown, Ill. Fl. N. Amer. ii. 292 (cum ic.) (1897); et auct. Amer.

Galega virginiana L. Sp. Pl. ed. 2, 1062 (1763) (quoad syn. Pluk. Alm.); Mill. Gard. Dict. ed. viii. no. 4, excl. syn. (1768); Hill, Veg. Syst. xxi. p. 55, t. lv. fig. 1 (mala) (1772); Walt. Fl. Carol. 187 (1788); Michx. Fl. Amer. ii. 67 (1803); Soland. MSS. in Herbb. Sloane & Banks!.

Tephrosia virginiana Pers. Syn. ii. 329 (1807); Pursh, Fl. Amer. Sept. ii. 489 (1814); Nutt. Gen. N. Amer. Pl. ii. 119 (1818); Elliott, Bot. S. Carol. ii. 245 (1824); DC. Prodr. ii. 250 (1825); Torr. & Gray, Fl. N. Amer. ii. 295 (1838); Chapm. Fl. S. United States, 94 (1860); S. Wats. Bibl. Index, 260 (1878); Robinson in Bot. Gaz. xviii. 196 (1899).

Tephrosia virginica Bigel. Fl. Boston. (sphalm.) ed. 2, 278 (1824).

Tephrosia holosericea Nutt. in Journ. Acad. Philad. vii. 105 (1834).

Tephrosia virginiana γ *holosericea* Torr. & Gray, Fl. N. Amer. ii. 296 (1838); Wats. Bibl. Index, 260 (1878); Robinson in Bot. Gaz. xviii. 196 (1899).

Cracca virginiana holosericea Vail in Bull. Torr. Club, 1895, 27; Britton & Brown, Ill. Fl. N. Amer. ii. 293 (1897).

III. Cracca Seemanni sp. n.

There remains for consideration a plant collected by Seemann in Mexico (Sierra Madre, no. 2191), which is cited as *T. virginiana* (= *Cracca holosericea*) by Mr. Hemsley (Bot. Biol. Centr.-Amer. i. 258), and was noted by Bentham on the sheet in the National

Herbarium as "*T. virginiana* Pers. var." The specimens both at the British Museum and Kew stand out from *C. holosericea* by habit and by the thicker leaflets, which are glabrous and shining above and silky and very white beneath; the racemes bear fewer and somewhat smaller flowers. It is no doubt closely allied to *C. holosericea*, but, although with some hesitation, we propose it as a species, of which the following is a diagnosis:—

Cracca Seemanni, sp. n. Species certe *C. holosericeæ* valde affinis; differt imprimis foliolis crassioribus subtus albo-sericeis, racemis paucifloris et floribus paulo minoribus.

Suffruticosa, caulis patentim tomentoso-villosus ± 3 dm. longus, stipulis lanceolatis acuminatis, petiolis communibus brevibus, foliolis 11–19 coriaceis oblongis vel ovato-oblongis mucronatis superne glabris subtus albo-sericeis 0·8–1·5 cm. longis, ± 0·5 cm. latis costa media in pagina superiore impressa in pagina inferiore prominente; racemis terminalibus paucifloris et floribus interdum axillaribus, pedicellis gracilibus patentim villosis florentibus 1 cm.–1·3 cm. longis; calycis tubo villoso laciniis angusti-lanceolatis acuminatis; alis carinæ paulo brevioribus, carina obtusa glabra ± 1 cm. longa; leguminibus immaturis albo-sericeis. "Flores purpurei" (Seemann).

Hab. Mexico, *Seemann*, Sierra Madre, no. 2191.

IV. Benthamantha Alefeld.

This name was substituted by Alefeld in *Bonplandia* (1862, 264) for *Cracca* Benth., the name *Cracca* having already been employed generically for a section of *Vicia*. Dr. Kuntze, having unfortunately overlooked this, proposed (Rev. Gen. i. 164) a new name—*Brittonamra*—for *Cracca* Benth., but later (*l. c.* iii. 53)* recognized the claims of *Benthamantha*.

While working at *Cracca* (*Tephrosia* Pers.) we had occasion to refer to *Cracca* Benth., and it seems worth while to bring together the plants which have been referred to it and will have to be placed under *Benthamantha*. The employment of the name *Cracca* for three distinct groups of plants has already led to confusion,† and, until botanists have agreed either to maintain *Cracca* or *Tephrosia* Pers. or to retain the latter name, further difficulties will inevitably arise. Dr. Millspaugh, for example (Contrib. Fl. Yucatan, i. 22), places under *Cracca C. cinerea* and *C. caribæa*—plants representing two genera; in Contrib. ii. 299 he describes a new species, *C. Greenmanii*, which apparently belongs to *Benthamantha*, but again places next to it *C. cinerea* (*Tephrosia cinerea* Pers.); in Contrib.

* Mr. Hiern, in his notice of vol. iii. of the *Revisio*, referred (Journ. Bot. 1898, 498) to the numbering of its pages in two series, each in Arabic numerals differing only in the thickness of the type, as "apt to cause confusion." This is a very mild criticism of the method adopted by Dr. Kuntze, which, for purposes of quotation, would seem to have been devised for the express purpose of causing the greatest possible amount of confusion and inconvenience, with no compensating advantages.

† *e. g.* in *Index Kewensis*, *Galega ochroleuca* Jacq. is identified with *Vicia ochroleuca* L.

iii. 366 he adds *Cracca bicolor* Boiss. (which is apparently a *Benthamantha*), and associates it with *C. Greenmanii* and what he now calls "*Cracca villosa cinerea* L. (Kuntze)." * Dr. Millspaugh points out (*l. c.* 345) that the set of Schott's plants which he cites is numbered differently from that at the British Museum and at Kew; it may therefore be that no. 537 in his collection is as he states (*l. c.* 366) *C. cinerea*, although our specimens under that number, collected at the same place and on the same day, belong to *B. mollis* Alef. or a closely allied form. These, like Schott's no. 865 (from Yucatan), are labelled "*Tephrosia spicata* Torr. & Gray"; the two seem identical, and his 163 (from Merida) is also a *Benthamantha;* the two last numbers are not cited by Dr. Millspaugh.†

Whether the plants here enumerated can be retained as distinct species is open to doubt, as various puzzling intermediate forms exist between them. Dr. Kuntze (Rev. Gen. i. 164, 165) points out the inconstancy of certain characters relied on by previous authors to separate the species, and reduces all the plants which had up to that time been described under *Cracca* Benth. to varieties of *C. caribæa*.

In the National Herbarium there is a specimen from Jacquin of his *Galega caribæa*. The leaflets are small, 19–21 in number, oblong or lanceolate-oblong and aristate-mucronate, sericeous-villose, and not, as Jacquin states in his description, glabrous. The plant is figured and described in Jacquin's Select. Stirp. Amer. p. 212, t. 125 (1763), and there is a coloured representation of the same figure in the rare Select. Stirp. Amer. Pict. p. 100, t. 193 (circa 1780), of which an excellent copy is in the Department of Botany. Other early material of this species shows that the leaflets vary considerably both in size and number.

This variability may be shown by giving the measurements in four specimens which seem certainly referable to this species, although the one from Martinique (Hahn, no. 241) was distributed as *Tephrosia cinerea*. The leaflets in Jacquin's specimen are only 5–6 mm. long; in Hahn's plant they are 1–1·2 cm.; in West India specimens from De Ponthieu they are 1·2–1·5 cm.; while in plants from St. Lucia they reach 2·5 cm. The pubescence likewise varies from sericeous-villose in the smaller leaflets to strigose-pubescent in the larger. We have not found any plants of *B. caribæa* with entirely glabrous leaves. The apparently good character derived from the shape of the sepals is also apt in this genus to be somewhat deceptive; for instance, the sepals of *B. ochroleuca* as figured by Jacquin are shorter than they are in the specimens cited by Bentham as representing this species. For the purposes of this enumeration, however, we retain the species as published.

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* The modern American invention of trinominals seems to demand strenuous protest.

† We note that Dr. Millspaugh (*l. c.* p. 364) proposes a new name—*Bauhinia Cavanillei*—for *Pauletia inermis* Cav.; he has apparently overlooked our identification of this plant with *B. ungulata* L. (see Journ. Bot. 1897, 232.)

B. CARIBÆA O. K. Rev. Gen. iii. 53.

Galega caribæa Jacq. Select. Stirp. Amer. p. 212, t. 125 (1763); Select. Stirp. Amer. Pict. p. 100, t. 193 (1780 ?).

Tephrosia caribæa DC. Prod. ii. p. 251 (1825).

Cracca caribæa Benth. in Videnskr. Meddel. Kjöbenhavn, 9 (1853); Duss Fl. Antilles, p. 195 (1897).

Brittonamra caribæa var. *η Jacquiniana* O. K. Rev. Gen. i. 165.

B. GLABRESCENS Alefeld, in Bonplandia, 1862, 264.

Cracca glabrescens Benth. *l. c.*

Tephrosia glabrescens Benth. Bot. Sulph. p. 81 (1844).

Brittonamra caribæa γ glabrescens O. K. *l. c.*

B. GLANDULIFERA Alefeld, *l. c.* p. 264.

Cracca glandulifera Benth. in Vidensk. Meddel. Kjöbenhavn, 8 (1853).

Tephrosia glandulifera Benth. Pl. Hartweg, 115 (1843); and Bot. Sulph. p. 81 (1844).

B. GRAYI Alefeld, *l. c.*

Cracca Edwardsii A. Gray, Pl. Wright, p. 35 (1853); Proc. Am. Acad. xvii. 201 (1882).

C. glabrescens Hemsley, Biol. Centr.-Amer. i. 262 (1880), non Benth., ex A. Gray, *l. c.*

Var. GLABELLA.

Cracca Edwardsii Gray, var. *glabella* Gray, *l. c.*

B. MOLLIS Alefeld, *l. c.* p. 264.

Cracca mollis Benth. in Videnks. Meddel. Kjöbenhavn, 9 (1853).

Tephrosia mollis H. B. K. Nov. Gen. v. 463 (1821).

Brittonamra caribæa δ mollis O. K. *l. c.*

B. OCHROLEUCA Alefeld, *l. c.*

Cracca ochroleuca Benth. *l. c.* non Alef.

Tephrosia ? ochroleuca Pers. Syn. ii. 329 (1807).

Galega ochroleuca Jacq. Ic. Rar. p. 15, t. 150 (1781); Collect. i. 79 (1786).

Brittonamra caribæa var. *ε ochroleuca* O. K. *l. c.*

B. SERICEA.

C. Edwardsii var. *sericea* A. Gray, *l. c.*

C. sericea A. Gray, in Proc. Am. Acad. xix. 74 (1883).

Brittonamra caribæa var. *δ Edwardsii* O. K. *l. c.* 165 from description seems to belong to this form.

To this genus the following, so far as can be judged from figures and descriptions, apparently belong :—

Cracca bicolor Micheli in Bull. Herb. Boiss. ii. p. 444, t. xi. (1894).

Cracca Greenmannii Millsp. Contrib. Fl. Yucatan, ii. 299, t. xiii. (1896).

Cracca micrantha Micheli in Prim. Fl. Costaricensis, Fasc. i. 189 (1891).

MOSSES OF FALMOUTH AND THE NEIGHBOURHOOD.

By the Rev. W. H. Painter.

The Mosses recorded below were gathered by me when staying at Falmouth between February and the middle of May, 1898, to which I have added a few which Mr. G. H. Fox, of Falmouth, has furnished me with from the neighbourhood of Penzance. Against these last-mentioned Mosses I have placed "F," as well as against the habitats with which he has supplied me, whilst my own gatherings are distinguished thus (!).

I am greatly indebted to Messrs. Benson and Hamilton, of Shrewsbury, and to Mr. E. C. Horrell and Mr. H. N. Dixon for examining and naming the Mosses submitted to them, especially to the first-named botanist.

The nomenclature and sequence adopted is that of Dixon and Jameson's *Student's Handbook of British Mosses*.

Sphagnum cymbifolium Ehrh. Budock Rocks !—*S. subsecundum* Nees var. *contortum* Schp. Budock Rocks ! Porthgwarra, near Penzance, *F.*—*S. acutifolium* Ehrh. Penjerrick !

Catharinea undulata W. & M. Common.

Polytrichum aloides Hedw. Pennance Point; Pendennis Point! —*P. juniperinum* Willd. Pennance Point; Budock Rocks. —*P. formosum* Hedw. Sunny Corner, Truro; Budock Rocks !

Pleuridium subulatum Bab. Trefusis and Pennance Points; Glendurgan !

Ceratodon purpureus Brid. Very common.

Dicranella heteromalla Schp. Common.—*D. varia* Schp. Sandy Cove, Falmouth.

Campylopus fragilis B. & S. Pennance Point !

Dicranum scoparium Hedw. Penjerrick; Glendurgan; Budock Rocks !

Fissidens viridulus Wall. Near Falmouth ! — *F. bryoides* Hedw. Sunny Corner, Truro; Trefusis fields; Budock; Swanpool ! — *F. taxifolius* Hedw. Near Falmouth; Sunny Corner, Truro !

Grimmia apocarpa Hedw. Budock Rocks !—*G. maritima* Turn. Trefusis Point, where it had been previously gathered; Pennance and Pendennis Points ! — *G. pulvinata* Sm. Budock Rocks, and Sunny Corner, Truro !

Rhacomitrium fasciculare Brid. and *R. heterostichum* Brid. Budock Rocks !

Ptychomitrium polyphyllum Fürnr. Falmouth and Budock Rocks ! St. Kevern Churchyard, *F.*

Hedwigia ciliata Ehrh. Budock Rocks !

Pottia Heimii Fürnr. Pendennis Point ! — *P. truncata* Lindb. Pennance and Pendennis Points; Budock ! — *P. minutula* Fürnr. Pendennis Point !, where it had been previously found by Mr. Tellam, of Bodmin.

Tortula aloides De Not. Near Swanpool, Falmouth, in small quantity ! — *T. cuneifolia* Dicks. Sunny Corner, Truro !, where it

had been previously found by Mr. Tellam. — *T. muralis* Hedw. Common.

Barbula rubella Mitt. In small quantity near Swanpool, Falmouth! — *B. tophacea* Mitt. Pendennis and Pennance Points; Sandy Cove, Falmouth! — *B. fallax* Hedw. Pendennis Point! — *B. convoluta* Hedw. Sunny Corner, Truro, and Pennance Point! — *B. unguiculata* Hedw. Common.

Weissia microstoma C. M. Trefusis Point; Budock! — *W. viridula* Hedw. Common!

Trichostomum mutabile Bruch. var. *littorale* Dixon. Sunny Corner, Truro! "A large form," H. N. Dixon. — *T. flavo-virens* Bruch. In fruit, Sandy Cove, Falmouth! Passed by H. N. Dixon. This is the first record of the fruit of this moss having been found in this country. Maenporth and Pennance Point! — *T. nitidum* Schp. Rocks, Falmouth and Maenporth!

Ulota crispa Brid. Glendurgan, *F.*—*U. phyllantha* Brid. Pennance Point! Swanpool, near Falmouth, *F.*

Orthotrichum diaphanum Schrad. Trees, Pennance; walls, Falmouth!

Physcomitrium pyriforme Brid. Swanpool! St. Kevern Churchyard, *F.*

Funaria ericetorum Dixon. Pennance Point! Porthgwarra, near Penzance, *F.* — *F. hygrometrica* Sibth. Falmouth and Sunny Corner, Truro!

Bartramia pomiformis Hedw. Sunny Corner, Truro!

Webera nutans Hedw. Budock!

Bryum alpinum Huds. Budock Rocks! — *B. atropurpureum* W. & M. Pennance Point! — *B. cæspiticium* L. Budock; Penjerrick! — *B. capillare* L. Budock Rocks and Pennance Point! — *B. inclinatum* Sw. Pennance Point! — *B. argenteum* L. Falmouth!

Mnium undulatum L. Budock! — *M. hornum* L. Common! — *M. punctatum* L. Glendurgan and Budock!

Neckera complanata Hübn. Budock!

Pterygophyllum lucens Brid. Glendurgan, where it was pointed out to me by Mr. Fox; Trefusis Wood, and near Marlborough Cottage, Falmouth!

Porotrichum alopecurum Mitt. Budock Rocks and Helford! Penjerrick, *F.*

Thuidium tamariscinum B. & S. Pennance Point! Trefusis fields, &c.; Glendurgan (pits), *F.*

Pleuropus sericeus Dixon. Trefusis Woods and Sunny Corner, Truro!

Brachythecium rutabulum B. & S. Maenporth; Budock Rocks, and near Falmouth! — *B. velutinum* B. & S. Pennance Point! — *B. populeum* B. & S. Near Falmouth! — *B. purum* Dixon. Maenporth; Glendurgan; Budock Rocks; Falmouth Cemetery!

Eurhynchium piliferum B. & S. Glendurgan! — *E. pralongum* B. & S. Common! — *E. Swartzii* Hobk. Penjerrick! — *E. tenellum* Milde. Near Falmouth! — *E. myosuroides* Schp. Trefusis Wood; Budock Rocks; and Glendurgan! — *E. striatum* B. & S. Maenporth; Glendurgan; Penjerrick; Pennance; and Helford! — *E.*

rusciforme Milde. Penjerrick and Helford! Porthonstock Wood, St. Keverne, *F.*—*E. confertum* Milde. Common!

Plagiothecium Borrerianum Spr. Budock Rocks! — *P. denticulatum* B. & S. Helston and Falmouth! — *P. sylvaticum* B. & S. Glendurgan!

Amblystegium serpens B. & S. Common.

Hypnum cupressiforme L. Budock Rocks; Glendurgan; Truro; Falmouth! approaching var. *resupinatum* Schp. Bull's Avenue, Falmouth; Budock! — Var. *ericetorum* B. & S. Budock Rocks, in small quantity! — *H. cordifolium* Hedw. Swanpool Marsh! — *H. cuspidatum* L. Trefusis Woods! Gillingvase Marsh, near Falmouth, *F.*—*H. Schreberi* Willd. Falmouth!

Hylocomium splendens B. & S. Falmouth!—*H. squarrosum* B. & S. Pennance Point and Glendurgan! — *H. triquetrum* B. & S. Budock Rocks, and Pennance Point, and Glendurgan!

REPORT OF DEPARTMENT OF BOTANY, BRITISH MUSEUM, 1898.

By George Murray, F.R.S.

The additions to the collections by presentation have consisted of:—Types of 3 species of *Asarum*, by W. W. Ashe; 180 Malayan Plants, by H. N. Ridley; 20 Australian Plants, by Miss Jessie Hussey; 301 Plants from Novaya Zemlya and Waigatz, by Col. H. W. Feilden; 28 Plants from Machakos, by Dr. S. L. Hinde; 70 Plants from Tibet, by A. H. Savage Landor; 21 Orchids from Messrs. Veitch; 92 Siamese Plants, by S. S. Flower; 591 Rhodesian Plants, by Dr. R. F. Rand; 524 Flowering Plants and 35 Cryptogams, by J. F. Duthie; 627 Cape Plants, by Capt. Wolley Dod; 346 Plants and 14 Fruits from Christmas Island, by Sir John Murray; 192 West African Plants, by J. W. H. Migeod; 169 Flowering Plants from Asia Minor, by Capt. F. R. Maunsell; 88 European Flowering Plants, by Mrs. E. G. Clink; 4 Orchids, by Messrs. Sander & Co.; 4 Orchids, by Sir Trevor Lawrence; a collection of Phyto-plankton from the Atlantic, by Captain C. S. Tindall; 44 Marine Algæ from Mauritius, by J. Cosmo Melvill; 2 Marine Algæ from Grand Canary, by Miss Anna Vickers; 176 Cryptogams from North-West India, by J. F. Duthie; 52 Cryptogams from New Zealand, by D. Thomson; 52 Ferns from Jamaica, by William Fawcett; 3 Slides of Rhodesian Diatoms, by T. Comber; 32 Slides of American Diatoms, by B. W. Thomas; 2 collections of Phyto-plankton from the Indian Ocean, by Capt. Cowie; 578 Cryptogams, by Mrs. K. M. Lyell; 88 specimens and 28 slides of Mycetozoa, by Arthur Lister; a collection of Phyto-plankton from the Indian Ocean and China Sea, by Capt. Leigh; 2 Californian Hepatics, by Marshall A. Howe.

The following additions have been made by presentation to the British Herbarium:—14 specimens British aliens, by S. T. Dunn; 4 Phanerogams, by W. Whitwell; 346 Phanerogams and 2 Characeæ, by Rev. E. S. Marshall; 65 Rubi, by Rev. W. Moyle Rogers; 96

specimens, by W. A. Shoolbred; 23 Characeæ, by Rev. G. R. Bullock-Webster; 61 Mosses, by H. N. Dixon.

The following additions have been made by exchange of duplicates:—73 Cape Plants from Professor McOwan; 824 Indian Plants from the Calcutta Botanic Gardens; 146 North American Phanerogams collected by J. R. Vasey; and 37 specimens (mostly Malvaceæ) from J. N. Rose.

The following specimens have been acquired by purchase:—Four hundred Phanerogams from Canaries, by Rev. R. P. Murray; 1524 Phanerogams from South Africa, by Dr. F. Wilms; 1120 Phanerogams from South Africa, by R. Schlechter; 108 Phanerogams from New Guinea, from Dr. Garcke; 1519 Phanerogams and 141 Cryptogams from Utah, by Marcus Jones; 100 Phanerogams from South California, by S. B. Parish; 150 Mexican Plants, by C. G. Pringle; 95 Phanerogams from Natal, by J. M. Wood; 314 Phanerogams and 48 Cryptogams from Cameroons, by Zenker; 680 Mexican Plants, by Ed. Palmer; 203 Phanerogams from Florida, by G. M. Collins; 117 Phanerogams from Costa Rica, by H. Pittier; 970 Chinese Plants, by Rev. Father Hugh; 494 North African Plants, by Dr. L. Murbeck; 400 Italian Fungi, by Saccardo; 51 Mosses and 58 Lichens from North America, by Small; 100 South European Mosses, by Fleischer and Warnstorf; 150 North American Algæ, by Collins, Holden, and Setchell; 81 Mosses of Tahiti, by Bescherelle; 20 European Algæ, by De Toni; 250 Fungi, by Sydow; 113 East Indian Hepatics, by Schiffner; 303 Cryptogams from Labrador and Newfoundland, by Waghorne; 141 North American Cryptogams, by Jones; 34 Algæ from Florida, by Curtiss; 76 Vascular Cryptogams from South Africa, by Wilms; 10 Mexican Fungi, by Pringle; 90 North American Fungi, by Seymour and Earle; 100 North American Fungi, by Ellis and Everhart; 40 North American Lichens, by Cummings, Williams, and Seymour; 100 North American Algæ, by Tilden; 100 Bohemian Mosses, by Bauer; 100 Saxon Fungi, by Krieger; 12 sheets of water-colour drawings of Fungi, by W. G. Smith; set of tracings of Mocino and Sesse's drawings of Mexican Plants; and 84 microscopic preparations, by Deby.

SHORT NOTES.

Ranunculus Baudotii Godr. — In May, 1896, I noticed in the lake in Wimbledon Park, where *Ranunculus peltatus* Schrank is exceedingly plentiful, a few plants of an aquatic *Ranunculus* which appeared to be of a different species. Upon examination I came to the conclusion that they belonged to *R. Baudotii* Godr., and since that date Messrs. H. & J. Groves, who have seen fresh specimens of the plant, have expressed the same opinion. *R. Baudotii* has not hitherto, I believe, been recorded for Surrey, but specimens from Plumstead Marshes, not far from the county boundary, are in the herbarium of the British Museum. It is possible that the plant, which usually grows near the sea, may have been recently intro-

duced at Wimbledon; but as one or two other maritime species—e. g. *Rumex limosus* Thuill. and *Scirpus maritimus* L.—still occur in the vicinity, I think it more probable that *R. Baudotii* may be a survival from the days when the tidal influence of the Thames extended much farther than at present along the valley of the Wandle.—H. W. Pugsley.

Suffolk Aliens.—The following plants were collected last year near Lowestoft and Oulton Broad—in the former locality by Mr. W. A. Dutt, in the latter by myself. The localities are indicated by initials:—*Sisymbrium pannonicum* Jacq. (O. B.), *Conringia orientalis* Dum. (O. B.), *Lepidium Draba* L. (O. B.), *L. perfoliatum* L. (O. B.), *Iberis umbellata* L. (O. B.), *Saponaria Vaccaria* L. (L. & O. B.), *Geranium phæum* L. (L.), *G. striatum* L. (L.), *Trigonella cærulea* Ser. (O. B.), *Coronilla scorpioides* Koch (L.), *Trifolium resupinatum* L. (O. B.), *Vicia varia* Host (O. B.). *Bupleurum rotundifolium* L. (L. & O. B.), *Carum Carvi* L. (O. B.), *Coriandrum sativum* L. (L. & O. B.), *Caucalis latifolia* L. (O. B.), *C. daucoides* L. (O. B.), *Asperula arvensis* L. (L. & O. B.), *Erigeron canadense* L. (L. & O. B.), *Anthemis tinctoria* L. (L. & O. B.), *Cnicus setosus* Bess. (O. B.), *Mariana lactea* Hill (L. & O. B.), *Anagallis cærulea* L. (O. B.), *Asperugo procumbens* L. (L. & O. B.), *Marrubium Alysson* L. (O. B.), *Plantago arenaria* W. & K. (O. B.), *P. Lagopus* L. (O. B.), *Phalaris paradoxa* L. (L. & O. B.), *Lolium italicum* Braun (L.), *Lagurus ovatus* L. (O. B.).—F. Baker.

Note on Alisma. — In this Journal for 1893, p. 48, the Rev. E. S. Marshall recorded a variety of this species—"v. *zosterifolium* Fr."; and mentions, among some references that I had given him, "var. *sparganifolium* Fr. Mant. iii. p. 183" (1842). So far as the quotation goes, this is correct, as Fries there puts the plant under *ranunculoides*, and refers to *Bot. Notiser*, 1840 [p. 35]; but in his *Summ. Veg. Scand.* p. 65 (1846), Fries placed it under *natans*, of which it is a variety. Marsson, *Fl. Neu-Vorpommern*, pp. 446–7 (1869), gets over the difficulty by putting the plant under both species, but under *natans* gives no reference. In the twelfth edition of Hartmann's *Skand. Fl.* p. 39 (1889), it is reduced to a form—"f. *zosterifolia*." Prahl (*Krit. Fl. Schlesw.-Holst.* 204 (1890)) and Aschers. & Graebner (*Fl. Nordost. Flachlandes*, p. 67 (1898)) both give *sparganifolium* under *natans*. The plant should stand as:—

Alisma natans L. var. sparganifolium Fr. (Mant. iii. p. 183, 1842; Summ. Veg. Scand. p. 65, 1846). *Echinodorus natans* Engler, var. *sparganifolius* Aschers. Fl. Brandenb. i. 652 (1864).

In the *Flora of Perthshire* I do not find any reference to a variety of *A. Plantago* which Dr. Buchanan White sent me. It is doubtless as he has labelled it, "var. *graminifolium* Wahlenb." Fl. Suec. i. p. 228 (1824). His note on it is: "This I suppose = γ *graminifolium* Wahlenb., but perhaps that is only an extreme state of β *lanceolatum* With., which, however, I have not seen. It grew in several feet of water, and no flowers were seen. I have not seen it elsewhere." The locality was "Kings Myre, Perth, 19.8.1885."—Arthur Bennett.

NOTICE OF BOOK.

Nova Synopsis Ruborum Germaniæ et Virginiæ. Pars I. [Monographical contributions to the knowledge of the genus *Rubus*, especially of the Brambles of Germany and Virginia. By Ernst H. L. Krause, M.D. First Part. Quarto; pp. 105, tabb. 12. Saarlouis, 1899; published by the Author. Price 13·60 marks.]

The Editor has asked me to say something about this well-printed book, as our *doyen*, Rev. W. Moyle Rogers, is unfortunately debarred from doing so through not understanding German. He would have brought to the task an accurate knowledge, wide as well as deep, which I do not possess; having, however, in recent years sampled the principal bramble-forms of various districts, sometimes in company with specialists, I am fairly well acquainted with the best-marked and most widely distributed among them, and may hope to have formed tolerably sound and reasonable opinions about the value which can be placed, broadly speaking, on our alleged species. The prolific *Rubus*-flora of an outlying and detached group like the British Isles affords exceptionally good material for testing the work of continental (especially western) authors: visits from Focke, Areschoug, and Gelert have helped considerably towards this comparison, but a long period of study will be needed before it can approach completeness. Unfortunately, Dr. Krause, although he has visited Great Britain, does not appear to have collected here; and his remark (p. 16): "I was unable to identify the *Rubus*-forms observed in England and Scotland with those of N. Germany" leads one to suppose that his researches were not very thorough.

The title of the work at once betrays a defective sense of proportion: it is not easy to see why one of the United States should be thus tacked on to Germany, nor could a single visit to Virginia qualify the author for attempting a monograph of its brambles. A sentence from the prospectus illustrates his mental attitude:—"The species adduced are of equal value with one another, and also of equal value with the universally acknowledged Central European species of *Salix*." This assertion is incapable of proof; a glance at his "Synopsis specierum" shows its absurdity, to say nothing about the test of experience. So far as Britain is concerned, no genus approaches *Rubus* in complexity of forms, excepting *Hieracium*; *Carex* or *Salix* may perhaps come third, but at a great distance.

Dr. Krause was formerly a disciple of Dr. Focke, whose *Synopsis Ruborum Germaniæ* served (naturally, indeed inevitably) as his text-book. At one time he went beyond the older student in subdivision, *e.g.* in dealing with the section *Subereeti*: but his views have since completely changed, and his present position is summed up as follows (p. 14): "Focke assumed, as the cause of the polymorphism of the brambles, that very numerous hybrids had developed from a few species. This hybrid-development he for the most part

assigned to an earlier geological period, and supposed that the original parents might have died out or changed. The essential difference of my conception from that of my teacher lies in my tracing the polymorphism of the brambles to the crossing of species still living and still distinguishable." Both theories rest mainly upon the presence of defective pollen-grains in a great majority of the brambles tested by Dr. Focke: a phenomenon which does not seem to have been verified hitherto by British microscopists, and which, if found to hold good, is a *primâ facie* presumption in favour of some hybrid origin, remote or recent. Of the two, Dr. Focke's appears to me to be by far the more probable, though I greatly doubt whether it can account for all the numerous existing British forms which are more or less constant. That brambles do in many cases interbreed is now indisputable; but the evident offspring of two markedly different parents is, as a rule, nearly or quite sterile. It has indeed been asserted that, when they spread by rooting at the tips, sterility tends to disappear; but real evidence does not seem to be forthcoming for this conclusion, much less for the assumption of Dr. Krause that the progeny of three, or even four, true species is frequently as fertile as any of the ancestors. He says (p. 6): "In my experience, hybrids predominate in all collections"; but is this capable of anything like proof?

The brief introduction is followed by an interesting essay on "the notion of a species." As regards evolution, there is (p. 8) this sensible remark: "We need only bear in mind that the species defined by us exists but for a time, not for ever. In spite of this ideal temporary limitation, the species are, for us, practically without exception, permanent; for, as a rule, the alteration of species in the vegetable kingdom progresses no faster than in the animal kingdom, including mankind. We are acquainted with a number of forms in both organic kingdoms which have not altered during several thousand years." The following definition is suggested as sufficient for ordinary purposes: "A species is the sum-total of all the individuals of a genus which can be properly included under one common name, and distinguished by it from other equivalent groups of individuals in the same genus." "Forms and individuals which exist outside species-limits" receive from the author the name of "out-species" (*Aussenarten*). I do not quite understand what is meant by this—probably, suspected hybrids.

Dr. Krause's chapter on nomenclature is most curious. After saying (p. 11) that "all scientific nomenclature misses its object unless the greatest possible permanence is striven for," and that "the much-lauded principle of priority has caused the greater muddle the more strictly it has been followed," he declares that he has, like Ascherson, abandoned the custom of appending the describer's name to species. What a delightful prospect lies before us, if this example is generally followed in Germany or elsewhere, the present work well illustrates; in a good many cases one can only conjecture what plant Dr. Krause intends by the particular name used. "Subspecies stand between variety and species, as a semicolon between comma and full stop." This is a good working

definition; the statement that hybrids are best designated by the names of their progenitors is also sound. In cases of [assumed] hybridity where only one parent can be ascertained, he writes the prefix "*semi-*" (e.g. *R. semicæsius* = *R. cæsius* × *R.* ——*?*); or "*pæne-*," if that one parent is very closely approached. When a writer presents us with such eccentricities as "*Rubus hybridus corylifolius quidam*," "*Rubus dubius suberectus cf. idæoæstivalis*," "*R. cæsioæstivaliidæovestitus*," "*R. Bellardii* × *vestitotomentosoæstivalis thyrsoideus qu.*," we are prepared for an announcement like the following (p. 13): "I hope to find an opportunity of carrying out my nomenclature in a Flora. I should then expunge the specific names *dubius*, *intermedius*, and *hybridus*, as well as all those composed with *pæne-*, *plus-*, and *semi-*, and all those composed of several Latin adjectives. Besides this, I should withdraw the *nomen specificum* from monotypes; I should, in recognizing the family *Adoxaceæ*, call *Adoxa moschatellina Adoxa familialis*, or else *Adoxa generalis*."

Pages 19 to 49 set forth the author's views upon all the European and certain North American species recognized by him as genuine. The former amount to only a dozen: *arcticus*, *idæus*, *tomentosus*, *sanctus*, *discolor* (*rusticanus*), *vestitus* (*leucostachys*), *Bellardii*, *cæsius*, *æstivalis* (*plicatus* + *Bertrami* + *sulcatus*), *saxatilis*, *humulifolius*, *Chamæmorus*. Eight are British; of these, *discolor*, *vestitus*, *Bellardii*, *æstivalis*, *cæsius* alone belong to the subgenus *Eurubus*. It may be said at once that the large number of "species" already recognized in this country could not have sprung from such a limited ancestry.

Our *R. suberectus* and *R. fissus* are placed as *æstivalis* × *idæus*, on grounds which seem to me quite insufficient. In Britain, at least, both are fairly constant, and such varieties as occur may be attributable to differences of soil, situation, and climate. In point of fact, the *suberectus* of Surrey and of Devon is just the same as that of Perthshire. *R. Rogersii* Linton, found from Ross to Kent and in N.E. Ireland, would doubtless have had the same origin assigned to it, if it had been known to Dr. Krause; but in some parts of Scotland it is among the most abundant of brambles, and fruits freely. Focke's *Corylifolii* are all "only *R. cæsius* and its hybrids"; yet *R. corylifolius* Sm. is common enough in the Northern Highlands, from which *cæsius* appears to be wholly absent. Focke's *Rhamnifolii* "are mainly *Semiæstivales*"—a conjecture not at all favoured by the case of *R. pulcherrimus* Neuman, which hardly varies at all (in my experience), whether it grows in Mayo, Argyle, Cardigan, or Surrey. *R. radula* and *R. foliosus* are classed as probably *Bellardii* × *tomentosus*; *R. Sprengelii* as a triple hybrid with *tomentosus* as one factor. *R. tomentosus*, however, is not British at all. The "*R. villicaulis*" of Schleswig-Holstein, Denmark, and Norway "belongs to the Proles hybrida of *R. vestitus*." But the common "*villicaulis*" of N. Scotland, accepted by Focke as the same thing, inhabits an area in which *vestitus* (*leucostachys*) does not occur. From these few instances it will readily be seen on what an unstable foundation Dr. Krause has built.

Sixteen pages are devoted to the alleged hybrids between *Rubus idæus* and the European blackberries, and thirty-seven to the bramble-forms of Alsace. This, with an explanation of the plates, brings Part I. to a conclusion. Regarded as a whole, I do not consider it a trustworthy contribution to science, though its preparation has evidently cost the author much labour, and he has displayed considerable ingenuity.

EDWARD S. MARSHALL.

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*ARTICLES IN JOURNALS.**

Annals of Botany (Dec.). — R. A. Harper, 'Cell-division in sporangia and asci' (3 pl.). — W. C. Worsdell, 'Vascular system of female 'flowers' of *Coniferæ*' (1 pl.).—H. M. Ward, 'Symbiosis.' —Id., 'Culture of Algæ' (1 pl.). — F. Darwin, 'Geotropism and localization of the Sensitive Region' (1 pl.). — Id., 'The Botanical Work of Charles Darwin' (portr.). — H. Wager, 'Sexuality of Fungi.'

Bot. Centralblatt (Nos. 48–52). — B. Leisering, 'Ueber die Entwickelungsgeschichte des interxylären Leptoms bei den Dicotyledonen' (concl.). — A. Nabokich, 'Ueber die Functionen der Luftwurzeln' (1 pl.). — (No. 48). L. Marchlenski, 'Zur Chemie des Chlorophylls.' — (Nos. 49, 50). 'Weitere Beobachtungen über die Biologie von *Helleborus fœtidus*.' — (No. 51). C. Wehmer, *Aspergillus varians*, sp. n. — J. Thomann, 'Ueber die Bedeutung des Atropin in *Datura*-Samen.'

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* The dates assigned to the numbers are those which appear on their covers or title-pages, but it must not always be inferred that this is the actual date of publication.

B. A. Fedtschenko, 'Novitiæ Floræ Turkestanicæ.' — R. Chodat, '*Pleurococcus* & *Pseudo-pleurococcus*.' — A. Chabert, 'Souvenirs d'antan' (cont.). — H. Schinz & H. Junod, 'Zur Kenntniss der Pflanzenmelt der Delagoa-Bay.'

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Rhodora (Dec.).—H. Webster, *Lepiotes rhacodes* (1 pl.). — M. L. Fernald, '*Ranunculus acris* var. *Steveni* in New England.'

BOOK-NOTES, NEWS, &c.

At the meeting of the Linnean Society on Nov. 16th, Mr. W. C. Worsdell read a paper on "The Comparative Anatomy of certain Species of *Encephalartos*." The chief features of the anatomy were shown to be the presence of several vascular cylinders in the stem, a character found also in *Cycas* and *Macrozamia*; and the *medullary* system of vascular bundles, forming, as in *Macrozamia Fraseri* Miq., a complex network, intimately united with a corresponding network

of mucilage-canals. The system of mucilage-canals in the pith is continuous with that of the cortex, but the medullary bundles form an independent *primary* system. The mucilage-canal system is probably of use as a storehouse of moisture during the dry season, when the roots and foliage die away. A younger seedling plant of *E. horridus* Lehm. exhibited in the hypocotyledonary region, the transitional region between stem and root, at one point a curious large cauline, and partially *concentric* strand, and several smaller strands or bundles lying farther out in the cortex. These, according to the author, represented the rudiments of the outer vascular cylinders. The character of these strands and the region in which they occur (which is that where the first-formed tissues are located, and where, therefore, ancestral characters would be sure to preponderate) tend to show that the collaterally constructed vascular cylinders were originally derived from vascular cylinders possessing a *concentric* type of structure such as is met with in the stems of such fossil plants as the *Medulloseæ*. In the opinion of the author the ancestry of modern Cycads must be looked for in that fossil group.

We are glad to note that the Enumeration of Chinese Plants, which has been suspended for five years and a half, has been resumed in the Linnean Society's Journal (Dec. 1). The present instalment contains the *Urticeæ* by Mr. C. H. Wright, the *Juglandaceæ* and *Quercineæ* by Mr. S. A. Skan, the remainder of the *Cupuliferæ* and the *Salicaceæ* by Mr. I. H. Burkill. Now that Mr. Hemsley has enlisted other contributors, we would suggest that, for convenience of citation, the name of the author should be placed at the head of each page, as is done in the African floras issued from Kew. As the work now stands, it is not easy to tell who has elaborated the *Artocarpeæ*, although from internal evidence we believe Mr. Hemsley is responsible for them. We trust that the completion of this important work will proceed without further hindrance.

We are glad to learn that our contributor Mr. James Saunders, of Luton, has been elected an Associate of the Linnean Society.

The contrast between the colouring of the plates in the earlier and the later volumes of the *Botanical Magazine*, like that between those of the first and third editions of *English Botany*, has long been a standing reflection upon the inferiority of modern methods; but we doubt whether this has ever been more strikingly exemplified than in the December issue of the former work, in which the colour in the flowers of *Kleinia Grantii* (t. 7691) is applied with a carelessness which should not be allowed to pass unnoticed.

The mysterious modes of publication which characterize the Kew *Bulletin* still continue. In October we had "Appendix I. 1900," dated for that year on wrapper and front page: now we receive "Appendix II. 1899," dated November and issued in December, and containing a list of "New Garden Plants of the Year 1898"! It is not easy to conceive what useful purpose can

be served by the publication of so belated a list. No author's name appears, so that it is impossible to know who is responsible for such original information as the list contains: *e. g.* that *Geonoma Pynaertiana* (which, by the way, is incorrectly cited, as in the original description there is a "?" after the generic name) is "an *Iguanura*, probably *I. diffusa*"; or that *Correvonia* is *Brassocattleya*. This anonymous and irresponsible method of publication must lead to serious confusion in the future, and demands a protest.

The Fifteenth Annual Report of the Watson Botanical Exchange Club (1898–99) contains many records of casuals and notes on anonymous *Rubi:* the latter can only interest those who have the specimens referred to. Some of the other notes seem superfluous —*e. g.* that on *Lilium Martagon*—"surely not considered a native here" etc. Messrs. Salmon point out that *Bromus maximus* Desv. = *B. rigidus* Koch (non Roth): "the name *B. rigidus* for this plant in Lond. Cat. ed. 9 is thus apparently an error." Mr. Dunn notes on a specimen of *Oxalis corniculata* from Sark, "Presumably from a garden: wild in Asia and America, but introduced in Europe." We are inclined to think the latter statement too absolute (and does it not occur in Africa?); while as to the former, Babington in 1839 recorded the plant from Jersey and Guernsey without any mark of introduction. "As it is not mentioned by the older British botanists, it is probably of comparatively recent appearance here even as a garden plant." This seems a *non sequitur;* moreover, it was cultivated by the younger Tradescant in 1656 (see Ait. Hort. Kew. ii. 115). There may be something to be said for its nativity in the West of England, where it has at any rate been naturalized for more than a century: Berkenhout (*Synopsis*, ii. 141) records it in 1795 from several places near Exeter, and Richard Weston (who died in 1806) sent specimens to Banks from "Dawlish Brooks, on a short sheepbite washed annually by a torrent from Haldon." Smith had it from Devonshire from four other collectors (see Eng. Bot. t. 1726).

Mr. E. D. Marquand sends us his paper on "Additional Guernsey Fungi," reprinted from the Transactions of the Guernsey Society of Natural Science for 1898.

The following, from the *Academy*, seems worthy of preservation: —"One of the most amusing misconceptions which we remember occurred in a recent *Daily Chronicle*, the whole mistake turning upon the two meanings of the word plant. This is the *Chronicle's* paragraph: 'The Pope takes great interest in an electric plant, to which he has given the name of "Officina Electrica Vaticana Alessandro Volta," in honour of Volta. A few days ago his Holiness made a special inspection of these plants, and the employees of the Vatican gardens were presented to him by the chief.' A comic draughtsman should certainly commemorate the scene. The picture might hang at Kew." A similar confusion lately induced a student to visit the National Herbarium

and inquire for "the sulphuric acid plant." He had been told that he would find this at South Kensington, and inferred that it would be in the Department of Botany, whereas the object of his search may be seen in the Science Collection of the Victoria and Albert Museum.

At the meeting of the Linnean Society on Dec. 7th, Dr. Otto Stapf exhibited specimens of Malayan and African species of *Kickxia* Blume, to show the differences which exist between the two forms. These differences were noticeable in the shape and size of the corolla, the insertion and general relation of the stamens to the tube of the corolla, the placentation, the structure of the fruit, and the general habit of the plants. As the name *Kickxia* would have to be retained for the Malayan species, he proposed the name *Funtumia* for the African species, from "funtum," a vernacular name for *F. elastica*. He further pointed out, by means of flowering and fruiting specimens of *F. africana* Stapf (*Kickxia africana* Benth.), and of *F. elastica* (*Kickxia elastica* Preuss), that the latter, and not the former (as was originally assumed), was the source of the so-called Lagos rubber, thus confirming the conclusion to which Dr. Preuss had come with regard to the origin of this rubber. Whether the name *Kickxia* (which should be spelt *Kixia*) can be retained, is doubtful: see Journ. Bot. 1899, p. 487.

Thomas Bruges Flower, F.R.C.S., who died at Bath on Oct. 7th, in his eighty-third year, had for at least sixty years been interested in British botany, as in 1839 (in which year he became a Fellow of the Linnean Society) he published a paper on Swansea plants in the *Magazine of Natural History* (iii. 561). In 1841, at which time he was living in London, he published in the *Phytologist* (i. 68) a list of Bristol plants, and he contributed several notes to the old series of that periodical. In 1845 he contributed a list of plants to J. C. Robertson's *Environs of Reading* (see *Flora of Berkshire*, p. clxix). In 1846 he botanized in Kent, and embodied the results of his researches in a *Flora Thanetensis*, published in 1847 at Ramsgate, where he then resided. In 1848, while at Seend, in Wiltshire, where he practised as a surgeon, he announced his intention of preparing a Flora of that county, for which he sent lists to H. C. Watson; this was published in the *Wiltshire Archæological Magazine* during the years 1857–1874. This mode of issue by small instalments in the journal of a local society is not favourable to publicity; apart from this, the Flora can hardly take rank as of the first importance, and it is practically superseded by Mr. Preston's *Flowering Plants of Wiltshire*, published as a volume by the same society in 1888. Mr. Flower's name has been chiefly known to the more recent generations of botanists in connection with *Draba aizoides*, which he collected and distributed for many years from its well-known locality, Pennard Castle, near Swansea. Various short notes from his pen, showing general rather than critical knowledge, will be found in several volumes of this Journal, the most interesting, perhaps, being that on the island of Steep Holmes (Journ. Bot. 1888, 26).

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A. Phalaris minor *Retz.* B. Milium scabrum *Merl.*

TWO GRASSES NEW TO THE CHANNEL ISLANDS.

By C. R. P. Andrews, M.A.

(Plate 406.)

Two grasses have been found in Alderney and Guernsey during the last year, of which one has not previously been recorded within the limits of the British Flora, while the other has only been noted once or twice as an undoubted introduction. Judging from the localities in which they grew, and from a comparison of their continental distribution, there is little doubt that they may both be considered as native plants.

The obvious objection which meets this statement at the outset is that numbers of the best British botanists have visited these islands since Babington's *Primitiæ Floræ Sarnicæ* in 1839 called attention to their great botanical interest, and that, if the plants were really native, they would have been discovered before. The objection can, I think, be satisfactorily answered in both cases. One of the two, *Phalaris minor* Retz, so closely resembles *Phalaris canariensis* L. that it has been passed over without interest as a casual. The probability of this is increased by the fact that *P. canariensis* is found fairly frequently in both Guernsey and Alderney. In the case of the other plant, *Milium scabrum* Merl., the habitat and the time of flowering will explain its neglect. It grows on the lower slopes of the southern cliffs in an unfrequented part, and flowers from mid-April to May. Botanists, as a rule, arrive in June or later: the spring plants on the southern face of the cliffs soon dry up in these sunny islands and disappear. These particular cliffs are visited in the winter for *Ophioglossum lusitanicum*, but all traces of the little fern have gone before *M. scabrum* is in flower. The plants which flower with it grow in equal or greater profusion in the more easily accessible lowlands, and the lower parts of the cliffs are seldom disturbed by botanists in the spring. The grass, as I saw it, is only 1–4 in. in height, and its small purplish panicle among the thick growth of the surrounding plants might well be overlooked, especially as the small purplish spike of *Mibora verna* is by no means uncommon in the same locality.

Phalaris minor Retz. Obs. Bot. iii. 8 (1783).

Syn. *P. aquatica* W. Sp. i. 236 (1797) et auct. plur. (non L.).
P. bulbosa Desf. Fl. Atl. i. 35 (1798).
P. decumbens Moench, Meth. 208 (1794).

Annual. Root fibrous. Stems several, often branched near the base, erect or ascending, 1–2 ft. in height, furrowed but smooth. Leaves flat, acuminate, about $\frac{1}{3}$ in. broad at the base, strongly veined, glabrous, rough on the edges. Uppermost sheath inflated, longer than its leaf. Ligule long, obtuse, clasping the stem. Panicle spike-like, ovoid or cylindric-oblong, 1–$1\frac{3}{4}$ in. long. Spikelets much compressed laterally. Two outer glumes $\frac{1}{2}$ in.

long, membranous, sharply acuminate, with a prominent green nerve on either side of the green keel; the upper half of the keel furnished with a scarious wing, of which the margin is dentate or erose towards the top. Fertile glume $\frac{1}{8}$ in. in length, laterally compressed so that the margins meet and completely enfold the palea, pale green, glabrous on the keel and on a small swollen portion at the base of either side, the rest covered with appressed silky hairs; at its base, opposite its margins, is a narrow acute hairy rudimentary glume, one-fourth as long as the fertile glume; the corresponding barren glume at the base of the keel of the fertile glume is reduced to a microscopic scale. Palea like the fertile glume, but much smaller, ciliate on the keel, but otherwise glabrous. Fruit compressed acuminate.

In the Plate—1, Spikelet; 2, rudimentary glume; 3, fertile glume—are magnified four times.

Distribution, according to Nyman.—Lusit.; Hisp.; Gall. occ. mer.; Ligur.; Ital. med. mer. ins.; Croat.; Dalm.; Attica; Algeria; Eubœa; Corinth; Cyclad.; Creta; Thrac. or. Richter (*Plantæ Europææ*, 1890) only gives "Regio mediterranea," which is certainly insufficient.

P. minor is distinguished from *P. canariensis* by the narrower shorter leaves, more cylindric panicle, and smaller spikelets; by the wing of the keel of the outer glumes, which, though very variable in the same panicle, is scarcely ever entire, and does not extend more than half-way down the keel; and by the presence of only one rudimentary glume, much smaller proportionately than those of *P. canariensis*.

In Grenier & Godron's *Flore de France* (iii. 438, 439 (1855–56)) it is stated that the stems of *P. minor* are "longuement nus au sommet," while those of *P. canariensis* are "brièvement nus au sommet." I find that this character is quite unreliable, varying greatly in both species.

Mr. E. D. Marquand, who is working at a Flora of Guernsey and the smaller islands, first called my attention to *P. minor* in Alderney last July, thinking that it was only a casual. It was growing in good quantity in a small sandy cultivated field; he has found it in other similar localities in the same island. I searched for it in Guernsey, and found it in several places; in good quantity in sandy cultivated fields by the sea, and twice sparingly on the sandy shore.

The plant is not uncommon on the west coast of France. Lloyd (*Flore de l'Ouest de France*, 393 (1886)) records it as occurring in cultivated fields, and especially gardens, in all the maritime departments from Vendée to Ille-et-Vilaine, where it grows near St. Malo and St. Briac, amongst other places. Corbière (*Flore de Normandie*, 626 (1894)) states that he has found it himself in sandy fields on the coast near Barfleur and Cherbourg, and accepts it as a native, though it is very rare so far north. Grenier & Godron give a long list of localities, including Barfleur, with no question as to its being native. Being a native of both sides of the bay in which the islands are situated, it might naturally be

expected to occur there also. That it has been overlooked through its likeness to *P. canariensis* is certain, for it is incredible that a casual should appear in the same year for the first time in considerable quantity in many parts of two islands which are as far apart from one another as Dover is from Calais.

Babington recorded *P. canariensis* as "naturalized in several places in Guernsey." In a list of the *Flora of Guernsey*, published by Mr. Marquand in 1891, it is stated that *P. canariensis* "appears native in sandy places" on the north-west coast. Mr. Marquand now believes that this was *P. minor*. I have often seen *P. canariensis* in gardens in Guernsey, but all the specimens from sandy ground by the coast which I examined last summer were *P. minor*.

In Townsend's *Flora of Hants*, p. 402, Mr. Marquand recorded *P. canariensis* as growing "in the sand at Mudeford, well established." In a letter to me he says that it was "growing abundantly, quite away from any habitations, and having every appearance of being wild," and suggests that this might be *P. minor*. It would be an interesting point for some Hampshire botanist to clear up next summer.

MILIUM SCABRUM Merlet de la Boulaye, Herbor. Maine et Loire, 220 (1809).

Syn. *M. confertum* Mill. Gard. Dict. (1768), non L.
M. confertum Guss. Fl. Sic. Syn. i. 131 (1842).
M. effusum β, Kunth, Enum. Plant. i. 66 (1833).
M. vernale Dub. et al. (non Bieb.), teste Nyman.

Annual. Root fibrous. Stems erect or ascending, 1½–4 in. high. Leaves flat, short, uppermost not one-fourth as long as its sheath. Sheaths strongly striate, somewhat inflated. Ligule long, acute. Panicle about 1 in. long, erect, contracted; branches short, 2-nate, unequal, capillary, flexuous. Spikelets ovoid, 1 line long. Two outer glumes equal, convex, obscurely 3-nerved, green or purplish, with narrow scarious border. Fertile glume smaller, pale green. smooth, shining; its margins enfolding the similar palea. Stem, sheaths, rachis, panicle-branches, and outer glumes all slightly scabrid.

In the Plate—1, Spikelet; 2, fertile glume; 3, palea—are magnified eight times

Distribution, according to Nyman.—Batav.; Belg. (sec. Parl.); Gall. occ. mer.; Cors.; Sicil.; Ital. med. mer.; Cretæ et Cephal. mont. ex Heldr. Richter gives "Eur. med. et mer.," which is again insufficient.

It seems impossible to distinguish *M. scabrum* specifically from *M. vernale* Bieb., which only differs in its larger size and diffuse panicle. It is said also to be less scabrous, but *M. scabrum* varies greatly in this character. Both plants grow in Italy, and Parlatore considers *M. scabrum* to be merely a variety of *M. vernale*. Richter gives it as *M. vernale* b. *scabrum*. Kunth classed it as a variety of the perennial *M. effusum*, but appears to be alone in this view. *M. vernale*, like *M. scabrum*, is an annual, and intermediate forms

can be seen in the British Museum Herbarium which it is difficult to assign with certainty to either.

I found this plant growing sparingly on the southern cliffs of Guernsey, near Petit Bot, on April 17th, 1899. These cliffs are about 300 ft. in height, the precipitous face varying from 100 to 150 ft.; the remainder consists of a steep slope, overgrown in many parts with gorse, heather, and bracken, and everywhere covered with vegetation, except where the granite projects in boulders. *M. scabrum* grows on the lower part of this green slope, well away from any houses or cultivated land; in no part of the island is one less likely to meet with an alien or casual.

Merlet's original specimens came from Thouars, in the department of Deux-Sèvres, where the plant still grows. Lloyd (*Flore de l'Ouest de France*, 402 (1886)) states that it is found in sandy places and sandy thickets in that department, and also in Gironde, Charente-Inférieure, and Vendée, but it is a rare plant. North of Vendée it only reappears on the coast of the Netherlands, certainly in South Holland, possibly in Belgium also. Oudemans (*Flora van Nederland*, iii. 475 (1874)) records it for the neighbourhood of Katwijk, the dunes near Overveen, and also near Wassenaar and Scheveningen, in Nordwijk. These localities are given in all the Dutch Floras, and there are specimens from Scheveningen in the British Museum. Van Hall (*Spec. Bot.* 32 (1821), and *Flora Belgii Septentrionalis* i. 55 (1825)) records it, but gives no localities for Belgium. Dumortier (*Observations sur les Graminées de la Flore Belgique* (1823)) says, "Plantam hanc rarissimam mecum communicaverunt amiciss. van Rees et van Hall," but gives no localities. Parlatore (*Flora Italica*, i. 155 (1848)) says, "E stata trovata in Belgio, in Francia," &c. Nyman gives Belgium only on Parlatore's authority, and the modern Belgian Floras omit it. Husnot (*Graminées de France, Belgique, Iles Britanniques, Suisse*, 1897) remarks that it is "indiqué en Belgique par Parlatore; il est très douteux que cette espèce y ait été réellement trouvée."

The most noteworthy points about *M. scabrum* in North-west Europe are, that it does not occur between Vendée and the Netherlands, that it grows on sand, and that it is generally much taller than the Guernsey plant (Culmi pedales—Dumort.: culmo vix pedali —v. Hall: spithamæum—Reichb.: chaume de 2–3 dec.—Lloyd). There are other plants which do not come further up the French coast than Finistère, and yet are found in Guernsey—e.g. *Ornithopus ebracteatus* (also in Alderney and Scilly Islands), *Ophioglossum lusitanicum*, and *Isoetes Hystrix*. The reappearance of *M. scabrum* in the Netherlands shows that there is no inherent improbability of its being native in Guernsey. Several plants which usually grow on sand are found on the Guernsey cliffs—e.g. *Romulea Columnæ* and *Juncus capitatus*, both of which grow near *M. scabrum*. Many of the cliff plants are much dwarfed, and I am told by a resident in Rome that *M. scabrum* grows there on walls, and is no larger than my Guernsey specimens.

I can see no reason to doubt that these two grasses are native

in the Channel Islands, and should therefore be included in the British Flora with *Cynosurus echinatus*, *Lagurus ovatus*, and *Bromus maximus*. Their discovery only serves to emphasize a fact which hardly needed emphasizing—*viz.* that the Channel Islands are, geologically and botanically, a part of France, and not of Britain.

TAXODIUM AND GLYPTOSTROBUS.

By Maxwell T. Masters, M.D., F.R.S.

There are two Coniferous plants, one a species generally so considered, from China, and the other a variety of a North American species, not infrequently confused with the Chinese plant. The variety is referred by some to one species, by others to another. The species also is included in one genus by some botanists, and is placed in another genus by others, so that, if we look to books only, as some of us are obliged to do, we find a terribly entangled series of statements, a confused nomenclature, and a long list of synonyms.

Those who are fortunate enough to have access to actual specimens can disentangle the confusion, and, if pressed for space and time, can, whilst setting forth the truth as they see it, afford to leave on one side the tangled maze of synonymy, if not wholly, at least to a considerable extent.

The two plants I refer to are the "Chinese Water Pine," the *Glyptostrobus heterophyllus* of Endlicher, Synops. 70 (1847) (disregarding the synonyms); and a variety of the Swamp Cypress or deciduous Cypress of Florida, *Taxodium distichum* Rich. There are in cultivation forms of the latter which are hardy enough to withstand our climate, but it is doubtful whether the Chinese plant can exist without adequate shelter. It seems probable that it might survive in mild winters, but that it would be destroyed in more severe ones. At Kew it is in cultivation in the Winter Garden.

Now, as to the two genera. Brongniart, in Ann. Sc. Nat. 1 Ser. xxx. p. 181 (1833), included the *Cupressus sinensis* of the Paris Garden under *Taxodium*. Endlicher (*l. c.* p. 69) proposed *Glyptostrobus* as a genus distinct from *Taxodium*, and gave under this name a good description of the Chinese genus, but the synonyms given refer to plants of other genera and other localities Speaking of the cone-scales and seeds of the Chinese tree, the Vienna botanist says, "squamis e basi cuneata in discum perpendicularem ovalem incrassatis," whereas he describes *Taxodium* (p. 67) as having "squamis excentrice peltatis . . . . squamarum stipite e basi tenuissima sursum incrassato dilatato, disco convexo; centro umbonato, margine superiore leviter toroso, longitudinaliter sulcato."

The seeds of *Glyptostrobus* he thus describes:—"Semina sub quavis squama 2, ejusdem foveolis immersa, erecta, ovata, compressa; integumentum membranaceum, marginibus anguste alatum,

basi in alam oblongam concolorem squamæ ungui adpressam et cum semine solutam productum."

Until young cones can be examined, and the fact ascertained with certainty, it would seem that it would be more correct to say that the seeds are pendulous, and not erect; but, in any case, the difference is great between the description of the seeds of *Glyptostrobus* and those of *Taxodium*, which latter runs: "Semina sub quavis squama geminea (*sic*), oblique erecta, basi attenuata squamarum stipiti inserta, integumento lignoso, irregulariter triedro, angulis acutis."

Parlatore, in DC. Prod. xvi². p. 438 (1868), following Endlicher, recognizes the two genera, as Carrière and Gordon had done before, and Karl Koch after him. Bentham, however, in Gen. Plant. iii. 429 (1880), combined *Glyptostrobus* with *Taxodium*, mixing up the characters of the two. Eichler (in Engler and Prantl, Die Naturl. Pflanzenfam. II. i. p. 91 (1889)) kept the two genera separate. Beissner (*Handbuch der Nadelholzkunde*, p. 134 (1891)), combines *Glyptostrobus* with *Taxodium*, and refers Endlicher's *G. heterophyllus* to the *Taxodium heterophyllum* of Brongniart. Sargent (Silva of N. America, x. p. 152 (1896)) refers the plant usually cultivated as *Glyptostrobus pendulus* to *Taxodium distichum* var. *imbricarium*. Of this acerose form he gives the following synonymy:—

Taxodium distichum var. *imbricarium*.

Cupressus disticha β imbricaria Nuttall, Gen. ii. 224 (1818).

Taxodium microphyllum Brongniart (1833), Endlicher (1847).

Taxodium ascendens Brongniart (1833).

Taxodium distichum sinense pendulum Loudon, Arboretum, iv. 2482 (1838).

Taxodium sinense γ pendulum Forbes, Pinetum Woburnense, 180 (1839).

Schubertia disticha β & γ, Spach, Hist. Veg. xi. 349, 350 (1842).

Glyptostrobus pendulus Endlicher, Synops. 71 (1847); Lindley & Gordon, Journ. Hort. Soc. Lond. v. 208; Knight, Synops. 21; Carrière, Traité Conif. 152; Hook. in Bot. Mag. t. 5603; Hoopes, Evergreens, 369, f. 59, 60.

Taxodium sinense Gordon, Pinetum, 309 (1858).

Taxodium distichum pendulum Carrière, *l. c.* ed. 2, 182 (1867); Veitch, Manual, 215; Beissner, Handbuch, 152; Hansen in Journ. R. Hort. Soc. xiv. 304.

Thus, according to Sargent, the tree met with in English gardens under the name *Glyptostrobus pendulus* is no *Glyptostrobus*, but a *Taxodium*, and a variety of *T. distichum*, and in this opinion I concur.

It may be added that *Taxodium distichum* was first described by Parkinson in 1640 from a plant cultivated in England, where it had been introduced by John Tradescant under the name of *Cupressus americana*; see Parkinson, Theatr. 1477, fig.; Catesby, Nat. Hist. Carol. i. 11.

Sargent also cites the following synonymy, some of it of doubtful application:—

Cupressus virginiana, foliis Acaciæ deciduis Hermann, Cat. Hort. Lugd. Bat. 207; J. Commelin, Hort. Amst. i. 113, t. 59; Boerhaave, Ind. Alt. Hort. Lugd. Bat. ii. 181.
Cupressus virginiana foliis Acaciæ cornigeræ paribus et deciduis, Plukenet, Phyt. 85, f. 6; Alm. Bot. 125.
Cupressus virginiana, foliis Abietis mollibus atque deciduis, Breyn, Prod. Sec. 40 [39]; ed. 2, 59.
Cupressus foliis distiche patentibus, Linn. Hort. Cliffort. 449; Clayton, Flor. Virgin. 119; Royen, Flor. Leyden. Prod. 88.
Cupressus americana foliis deciduis, Romans, Nat. Hist. Florida, 25.

The early history of the Chinese plant is somewhat involved, but it is certain that the plant spoken of by Plukenet (*Amaltheum*, p. 125) as "Juniperi folia Arbuscula Cheusanensis Conifera, foliis variis Cupressi squammosis, et Juniperinis" is *Juniperus chinensis* of Linnæus, as is shown by Plukenet's specimen in Herb. Sloane xciii. f. 214.

Endlicher includes two species in his genus *Glyptostrobus*, *G. heterophyllus* and *G. pendulus*, the latter with slender pendulous branchlets and leaves only half as large as those of *G. heterophyllus*, acuminate and approximate. Endlicher says *G. pendulus* is a native of China, but he gives no definite locality in support of his assertion, and the probability appears to be that the plant known as *G. pendulus* in gardens is, as before said, a variety of *Taxodium distichum*. Plukenet's plant, with most of the synonymy given under *G. heterophyllus*, must be excluded from Endlicher's description.

In herbaria where complete specimens of the Chinese (*Glyptostrobus*) and of the Florida plant (*Taxodium*) occur there is not the slightest difficulty in distinguishing the two genera. It is a different matter in the case of the living plants, because they have not, as a rule, reached the fruiting condition, whilst they have perhaps attained to that perplexing stage of variability in which the leaves alter in disposition, size, and form, and in which the direction of the branches (habit) varies greatly from that supposed to be typical. In reference to this subject it is desirable to quote what Sargent says as to the variety.

Alluding first to the species, Sargent (p. 152) says of *Taxodium distichum*: "The deciduous lateral branchlets are three or four inches in length, and spread at right angles to the branch; or in the form with acicular leaves they are pendulous or erect, and often six or seven inches long. The leaves on the distichously spreading branchlets are linear-lanceolate, apiculate, from one-half to three-quarters of an inch in length, about one-twelfth of an inch in width, and light bright yellow-green on both surfaces or . . . . silvery white below; and on the form with pendulous or erect branchlets they are compressed, long-pointed, keeled and stomatiferous below, concave above, more or less spreading at the free apex, and about half an inch in length; in the autumn the branchlets with their leaves turn dull orange-brown before falling."

Sargent adds in a footnote the following remarks:—"No one unfamiliar with the fact that branches of the two forms occasionally

appear on the same individual would imagine that the Cypress-like trees with erect or pendulous thread-like branchlets and closely appressed acerose leaves belong to the same species as those with spreading distichous branchlets and flat leaves. The acerose form . . . . has long been an inhabitant of the gardens of the eastern United States and Europe, and is generally cultivated as *Glyptostrobus pendulus* and believed to be a native of China."

It is worth recording that the two genera *Glyptostrobus* and *Taxodium* are well represented in a fossil condition. Renault (*Cours de Botanique Fossile* (1885), p. 119) cites two species from the miocene deposits of Switzerland, Bohemia, Greece, and Greenland, and from Sioux City, United States. Of *Taxodium* five species are also recorded in similar miocene deposits. The characteristic marks of distinction between the two genera are observable in the fossil species.

It would seem, then, that the two genera *Glyptostrobus* and *Taxodium* are amply distinct. The chief distinction of *Glyptostrobus* lies in the elongated cone-scale, which is not peltate; the bract is inseparable from the seed-scale at the base, but rather above the middle it becomes free and recurved, leaving bare the 5–7-lobed summit of the seed-scale. On the inner side of the seed-scale are two pockets or depressions in which lie the seeds. These are smooth, oblong or obovate, often with a short spur or funicle at the base and with a narrow wing on the side, prolonged beneath into a flat lancet-shaped wing. The seeds are described as erect, but they seem more likely to be pendulous. The point cannot be conclusively settled till material, especially cones in their early condition, is more abundant.

The cone-scales of *Taxodium*, as already stated, are peltate, and the erect seeds are irregularly three-sided, and scarcely, if at all, winged.

ADDITIONS TO THE FLORA OF WEST LANCASHIRE.

By J. A. Wheldon and Albert Wilson.

The following list contains a selection from a gradually accumulated and extensive series of notes on the West Lancashire Flora. It is intended to bring together numerous scattered records from various publications, and from our own note-books and herbaria, of species not mentioned for this area in *Topographical Botany* or in the *Reports of the Botanical Record Club*. No attempt is made to indicate the distribution of the species, that being one of the functions of a county flora rather than of such a catalogue as this: hence it must not be inferred that the localities given are the only ones in which we have observed the plants named. So far as we can at present ascertain, nearly all are new county records, therefore we have not called attention to this fact in individual cases by the usual sign. It is quite possible that some of the species may have been recorded previously through publications with which we

are at present unacquainted. A few less common plants are inserted, in order to supply personal authority where such is lacking in *Topographical Botany*; but, as we have no desire to claim these as new county records, they are distinguished by the obelisk sign †.

We include a number of extracts from the excellent little *Flora of the Stonyhurst District*, second edition, 1891 (quoted as *F. S.*), by the Rev. John Gerard, S.J., and the Rev. C. A. Newdigate, S.J., whose names, however, are modestly withheld from the title-page. As the Stonyhurst district embraces three vice-counties, the utility of this work from our point of view is somewhat limited by the use of general expressions to indicate the distribution of the species (*e.g.* "common," "abundant," etc.). We only include such as are specially ascribed therein to Lancaster West by the addition of the letter W. Some interesting plants are mentioned from just beyond our borders.

If some well-known workers' names are omitted here, it is only because their discoveries are fully recorded in the important publications mentioned in our opening lines, to which this list is supplementary. Where no authority follows a locality, it rests on the responsibility of the authors jointly; and the sign ! indicates that we are able to confirm records so marked.

In order to save space, casuals, aliens and denizens indiscriminately have an asterisk prefixed, while colonists, natives, &c., are undistinguished. We hope to deal at a later period with questions of status, altitudinal range, and distribution of species, and shall be glad to have notes or specimens from other botanists which are likely to be of service in this direction. The records marked *F. A. L.* were published by Dr. F. A. Lees in the *Naturalist*, 1899, p. 299. Other contractions used are *Wi.* (Wilson) and *Wh.* (Wheldon).

The Rev. W. M. Rogers, Rev. E. S. Marshall, and Mr. F. J. Hanbury have been kind enough to examine for us some doubtful species, and with characteristic courtesy have readily assisted us with their critical knowledge, for which we here tender our cordial thanks.

**Clematis Vitalba* L. Several plants about Bare, *F. A. L.*

Thalictrum collinum Wallr. Limestone rock-crevices, Dalton Crag, June, 1899, *Mr. Sydney Wilson* (with *Wh. & Wi.*).

**Adonis autumnalis* L. Waste ground, Bare, *F. A. L.*

Ranunculus fluitans Lam. In the Ribble at Ree Deep, not flowering, *F. S.* — *R. circinatus* Sibth. Canal near Lancaster, June, 1899, *Wh.* — *R. Baudotii* Godr. Pool on the sandhills, St. Annes, May, 1899, *Wh.*

Actæa spicata L. In a "pot-hole," Leck Fell, 1888, *Wi.*

**Papaver Rhœas* var. *strigosum* Boenn. Morecambe, on ballast, July, 1899, *Wh.* — *P. Argemone* L. Cornfield near St. Annes, 1898, *Wh.*

Fumaria Boræi Jord. Near Little Eccleston, 1895, *Rev. E. S. Marshall.* — *F. confusa* Jord. Near Little Eccleston, 1895, *Rev. E. S. Marshall.*

†*Cochlearia danica* L. St. Annes and Blackpool, *Wh.* — **C. armoracia* L. Garden escape, Stonyhurst, *F. S.*!

†*Sisymbrium Sophia* L. Near Lytham, 1897, *Wh.*

†*Brassica monensis* Huds. Between Lytham and St. Annes, 1896. *Wh.*

Diplotaxis muralis var. *Babingtonii* Syme. St. Annes, 1899, *Wh.*

**Hesperis matronalis* L. Banks of the Hodder below Whitewell, and in the bed of the river also, July, 1899, *Wh.*

**Lunaria rediviva* DC. Sands of Morecambe Bay, *J. Britten in Naturalist*, 1864, p. 203.

Coronopus Ruellii All. Near Garstang and Blackpool, *Wi.*

**Lepidium sativum* L. Morecambe, July, 1899, *Wh.*

†*Cakile maritima* Scop. Pilling and Knott End, &c., *Wi.*

†*Helianthemum Chamæcistus* Mill. Limestone rocks, Kellet, Warton and Silverdale district, abundant, *Wi.*

Viola ericetorum Schrad. Lytham, 1896, *Wh.*

Polygala oxyptera Reichb. Sandhills west of Lytham, 1895, *Rev. E. S. Marshall.*

**Saponaria officinalis* L. Banks of Lune, Ribble, and elsewhere, *Wi. & Wh.*

Silene Cucubalus var. *puberula* Wierzb. Ribble bank below Troughs, *F. S.*

Lychnis Githago Scop. Greenfield, *F. S.* Cornfield near St. Annes, 1896, *Wh.*

Cerastium semidecandrum L. Between Lytham and St. Annes, May, 1899, *Wh.*

Arenaria serpyllifolia var. *leptoclados* (Guss.). Bare, July, 1899, *Wh.*—Var. *Lloydii* (Jord.). Bare, July, 1899, *Wh.*

Spergula arvensis L. var. *sativa* Boenn. Near Freckleton, 1899, *Wh.*

Buda marina Dum. var. *neglecta* (Kindb.). Salt marshes, Pilling, 1895, *Wi.* — *B. media* Dum. With the last, *Wi.*

Hypericum elodes L. Formerly on Ribbleton Moor, now extinct, *Mr. Wm. Dobson in Rambles by the Ribble*, 1877. Succeeding records in Mr. Dobson's name are from the same source. Ribbleton Moor was drained about forty years ago, and is now built over; but Mr. Wilson, of Garstang (father of one of the authors) remembers gathering *Gentiana Pneumonanthe* there.

†*Malva rotundifolia* L. Between Blackpool and Marton, 1895, *Wi.*

Tilia cordata Mill. Rocky wood on limestone near Warton, 1888, *Wi.*

**Linum usitatissimum* L. Leagram, 1867, *F. S.*

**Geranium phæum* L. Near Higher Bridge, Shire Lane, and Longridge, *F. S.* Roadside near Barrow, Leck district, *Miss Maudsley.*—*G. purpureum* Forster. North of Bare, *F. A. L.* With some expression of doubt.

Genista anglica L. Formerly on Ribbleton Moor, now extinct, *Wm. Dobson.*

**Medicago denticulata* Willd. Seminary gardens, Stonyhurst, 1886-7, *F. S.*

**Trifolium hybridum* L. Field near Hacking Boat, 1887, *F. S.* Preston Docks, 1899, *Wh.*

Lotus corniculatus L. var. *crassifolius* Pers. Bare, 1899, *F. A. L.* And in other localities on the coast.

Hippocrepis comosa L. Limestone rocks, Warton Crag and Over Kellet, 1899. *Wi.*

Vicia angustifolia L. Near Pilling, 1894, *Wi.*—*V. lathyroides* L. Lytham and St. Annes, May, 1899, *Wh.*

Prunus fruticans Weihe. Near canal south of Hest Bank, *F. A. L.*

Spiræa Ulmaria L. var. *denudata* Boenn. Canal bank north of Bare, *F. A. L.*

[*Rubus suberectus* And. Sale Wheel, *F. S.*] — *R. incurvatus* Bab. Near Inskip, 1895, *Rev. E. S. Marshall.* "Not what I consider the typical form, but that which prevails in Derbyshire, Salop, and Lancashire, hardly differing from the type, except in its laxer panicle, crowded strongly falcate prickles, and somewhat thinner and less lobate leaves—characters suggesting a divergence from type towards *R. Colemanni*," *Rev. W. M. Rogers in lit.* 1899. — *R. Radula.* Near Bare, *F. A. L.*—*R. cæsius* var. *aquaticus.* Sandhills near Lytham, 1896, *Wh.* — *R. cæsius* × *Idæus.* Hurst Green, near a garden, with both parents, 1899, *Wh.*

Further notes on the Rubi of the vice-county will be found in Journ. Bot. March, 1896, p. 136 (Rev. E. S. Marshall), and October, 1898, p. 401 (J. A. Wheldon).

†*Geum rivale* L. Wennington and Hodder Valley. — *G. intermedium* Ehrh. Seminary Wood, Stonyhurst, *F. S.*! Near Kirkby Lonsdale Station, *Mr. L. Petty.*

Potentilla procumbens Sibth. Quarry Road, Kemple End, *F. S.*

[*P. fruticosa* L. "Sparingly on limestone rocks 100 yds. due E. of Nether Kellet Church, 8 miles beyond Lancaster," *Thos. Williams, Science Gossip*, Jan. 1870, p. 19. The locality is an unlikely one, and we have searched it for this plant with a negative result.]

**Rosa pomifera* Herm. Chaigley, *F. S.*

Pyrus malus L. var. *acerba* DC. Hindburn, &c.

Cratægus oxyacanthoides Thuill. Near Leck, *Mr. L. Petty* in "Plants of Leck and Neighbourhood" (*Naturalist*, March, 1893). Other records in Mr. Petty's name are from the same source.

**Saxifraga umbrosa* L. Plentiful and apparently thoroughly naturalized by a waterfall in Hindburn, 21 Oct. 1899.—*S. granulata* L. Dean Brook and Sale Wheel, *F. S.*

†*Chrysosplenium alternifolium* L. "Pot-holes" of Leck Fell and Easegill, *Wi.*

Ribes alpinum L. Near Chipping and Hurst Green, *F. S.*—**R. nigrum* L. Ribbleton Moor, *Wm. Dobson.* Brock Bottom, *Wi.*—**R. rubrum* L. By the side of Leck Beck, &c., *Mr. L. Petty.*

Sedum Telephium L. var. *Fabaria* H. C. Wats. Limestone Rocks near Silverdale, *Wi.*—**S. album* L. Chaigley and Chipping, *F. S.* Walls about Leck, *Mr. L. Petty.*

**Sempervivum tectorum* L. Roof of outhouse at Collin Holme, *Mr. L. Petty.*

†*Hippuris vulgaris* L. Near Bare, *F. A. L.* River Keer, Stodday, &c., *Wi.*

†*Peplis Portula* L. Formerly on Ribbleton Moor, *Wm. Dobson.*

Epilobium angustifolium L. Leck Fell, Chipping, Roeburndale, &c., *Wi.*

Apium inundatum Reichb. fil. Formerly on Ribbleton Moor, *Wm. Dobson.* Marsh between Yealand Storrs and Borwick, 1888, *Wi.*

Anthriscus vulgaris Bernh. Knott End, 1894, *Wi.*

**Peucedanum Ostruthium* Koch. Roadside near old barn, Oakenclough, 1888, *Mr. Sydney Wilson.*

Galium sylvestre Poll. Limestone rocks, Warton Crag, July, 1892, *Wi.*—*G. uliginosum* L. Swamp near Borwick, 1887, *Wi.*

Solidago Virgaurea var. *cambrica* (Huds.). On Yoredale grit rocks, Upper Easegill, Aug. 1899, *Wi.*

Filago germanica L. Leagram, *F. S.*! Bare, *F. A. L.*

†*Erigeron acre* L. Pilling, Cockerham, St. Annes, &c.

†*Bidens tripartita* L. Shard Bridge and Garstang, 1895, *Wi.*

**Chrysanthemum Parthenium* Pers. Ballast between Morecambe and Snatchems, 1899, *Wh.*

Matricaria inodora L. var. *salina* Bab. Near Bare, 1899, *F. A. L.* Bolton-le-Sands, 1893, *Wi.* Fleetwood, 1896, *Wh.*

**Petasites fragrans* Presl. Near Yealand, *Wh.*

**Senecio saracenicus* L. Ribble banks near Hacking Boat, 1863, *F. S.* Reported also from other Ribble bank localities in *Rambles by the Ribble.*

Carduus heterophyllus Willd. Higher Bridge Island, 1886. Not found since, *F. S.* Banks of the Roeburndale River about Salter, 1887, *Wi.*

Picris echioides L. Clay banks by the sea between Naze Point and Lytham, 1888, *Wi.*

Serratula tinctoria L. Gatebarrow Wood, Silverdale, 1899, *Wi.*

Hieracium murorum L. Ease Gill, &c., *Wi.* — *H. duriceps* F. J. H. var. *cravoniense* F. J. H. Ease Gill, Leck, 1888, and banks of Lune, Halton, 1896, *Wi.* — *H. vulgatum* Fr. Leagram, &c., *F. S.*! Longridge, 1891, *E. F. Linton*! — Var. *ravusculum* Dahlst. Sandhills near St. Annes, very local, 1895, *E. S. Marshall.* —*H. diaphanum* Fr. Longridge, *E. F. Linton* in Bot. Exch. Club Rep. 1892, p. 396. — *H. sciaphilum* Uechtritz. Lower Bleasdale, Garstang, *Wi.* — *H. rigidum* var. *tridentatum* (Fr.). Upper Ease Gill, Leck, 1899, *Wi.*—*H. boreale* Fr. Leck, *Mr. L. Petty.* Preston Wives, Longridge, Leck, &c. Common.

Leontodon hirtus L. Garstang, and elsewhere, 1887, *Wi.*

Taraxacum officinale Web. var. *erythrospermum* (Andrz.). Lytham and St. Annes, 1898, *Wh.* Warton Crag, 1899, *Wi.* — Var. *lævigatum* DC. Roadside near Lytham, 1898, *Wh.* — Var. *palustre* (DC.). Ease Gill, 1899. — Var. *corniculatum* DC. On limestone rocks near Ease Gill Kirk. This is similar to specimens so named by the Rev. W. R. Linton from Derbyshire.

Tragopogon pratensis var. *minus* (Mill.). Stonyhurst Churchyard, *F. S.* Bare, *F. A. L.*

**Campanula rapunculoides* L. Roadside near Pilling, 1895, *Wi.*

Primula vulgaris × *veris*. Near Riddings Farm, *F. S.*!

**Vinca minor* L. Near Hurst Green Church, *F. S.*

Gentiana baltica Murb. Between St. Annes and Lytham, *E. S. Marshall* in Bot. Exch. Club Report, 1895, p. 490!

**Polemonium cæruleum* L. Stonyhurst, Sale Wheel, &c., *F. S.*

Symphytum officinale L. Gas Wood, Stonyhurst, *F. S.* Near Wennington, 1899, *Wi.*

Myosotis repens G. Don. Fairsnape Clough, Bleasdale, 1899, *Wi.*

**Verbascum Blattaria* L. Three plants in a poultry-run near Bare, *F. A. L.*

Scrophularia umbrosa Dum. Knowle Green, 1899, *Wh.* Queried for "near Preston" in *Topographical Botany.*

Veronica polita Fr. Garden weed, Stonyhurst, *F. S.* Garstang, &c., 1894, *Wi.*

Euphrasia nemorosa H. Mart. Lytham, *Wh.* — *E. curta* Fries. Near Preesall, and Stalmine Moss, *Wh.*

Pedicularis palustris L. Bleasdale, Hindburn, &c., 1899, *Wi.* On Leck Fell, *Mr. L. Petty.*

Lathræa Squamaria L. Saddle Hill and Beezley Wheel, *F. S.*

Pinguicula vulgaris L. Leagram, *F. S.* Longridge Fell, Ease Gill, Bleasdale, &c.

**Mentha viridis* L. Lune banks, Halton, *Wi.*—*M. sativa* L. var. *rivalis.* Near Hest Bank, *F. A. L.* Hodder Valley, Catterall, and Garstang. — *M. rubra* Sm. Higher Bridge Island, *F. S.* Seen on Yorkshire side of the river, lower down, so probably correct, *Wh.*

†*Calamintha Clinopodium* Spenn. Saddle Hill and Beesley Wheel, *F. S.* Bare, *F. A. L.* Stodday, Wennington, Halton, &c.

Stachys arvensis L. Silverdale, Middleton, and Nether Kellet, 1888, *Wi.*

**Lamium maculatum* L. North bank of Ribble near Ribchester, *W. Dobson.*—*L. Galeobdolon* Crantz. Sale Wheel, *F. S.*

Plantago Coronopus var. *ceratophyllum* Rapin. Blackpool, 1896, *Wh.*

Littorella juncea Berg. Canal near Garstang, July, 1891, *Wi.*

Scleranthus annuus L. Near Garstang, 1888, *Wi.*

Chenopodium album L. var. *incanum* Moq. Preesall, 1899, *Wh.* —Var. *viride* Syme. Preston Docks, 1899, *Wh.* — **C. opulifolium* Schrad. Near Preston, 1897–8, *Wh.*—**C. urbicum* L. Near Morecambe and Preesall, 1899, *Wi.* — **C. rubrum* L. Preston Docks, 1899, *Wh.*

Atriplex Babingtonii Woods. Morecambe, July, 1899, *Wh.*—**A. Smithii* Syme. Lancaster, *Wh.* — *A. deltoidea* var. *prostrata* Bab. Heysham, and Wyre Estuary, 1899, *Wh.*

Polygonum aviculare var. *littorale* (Link). Morecambe, 1899, *Wh.* —Var. *vulgatum* Syme. Canal towing-path, Lancaster, 1899, *Wi.*

Rumex domesticus Hartm. Crowshaw Reservoir, *F. S.* — *R. crispus* × *obtusifolius.* Near Knowle Green, 1899, *Wh.*

**Euphorbia cyparissias* L. Grassy field between Lytham Vicarage and the sea, May, 1897, *J. C. Melvill.*

†**Ulmus surculosa* Stokes, var. *suberosa* Ehrh. Near Garstang, *Wi.*

Urtica dioica L. var. *angustifolia* Blytt. Knowle Green, 1899, *Wh.*

Betula verrucosa Ehrh. Middlebarrow Wood, Aug. 1899, *Wi.*
Quercus Robur L. var. *sessiliflora* (Salisb.). Near Wray, Oct. 1899.
Salix aurita L. Bleasdale, near Garstang, 1888, *Wi.*—*S. caprea* L. Hedges near Leck, *Mr. L. Petty*. Near Garstang, 1888, *Wi.*—*S. phylicifolia* L. Jumbles and Higher Bridge Island, *F. S.*—*S. nigricans* Sm. Rocks at the head of Bolton Roughs, *F. S.*—*S. Smithiana* Willd. Crowshaw Reservoir, Thornley, &c., *F. S.* Side of Leck Beck, *Mr. L. Petty*.

Populus nigra L. Bank of Leck Beck, planted ?, *Mr. L. Petty.*

Ceratophyllum demersum L. In the Hodder at Seed Holme Nook, 1887, *F. S.*

**Elodea canadensis* Michx. Near Hest Bank, 1899, *F. A. L.*, and elsewhere.

Neottia Nidus-avis Rich. Bolton Roughs, *F. S.*

Epipactis atrorubens Schultz. Warton Crag and Gatebarrow Wood, 1892, *Wi.*

Allium vineale L. Near Lancaster, 1896, *Wi.*

Gagea fascicularis Salisb. Ree Deep, 1886, *F. S.*

Juncus compressus Jacq. Longridge Fell, above Chadswell, *F. S.* — *J. diffusus* Hoppe. Near Hudd Lee Farm, *F. S.* Marshy pasture near Hest Bank, *F. A. L.* — *J. obtusifolius* Ehrh. Bare, *F. A. L.*

Potamogeton natans L. Garstang, *Wi.*, and elsewhere. Common.

Ruppia rostellata Koch. Ditches near Bolton-le-Sands, 1893, *Wi.* Freckleton Marsh, 1899, *Wh.*

Zannichellia palustris L. Canal, Lancaster and Carnforth, 1894, *Wi.*

Scirpus pauciflorus Lightf. Salt-marsh near Bolton-le-Sands, 1892, *Wi.* — *S. fluitans* L. Ditches near Morecambe, 1899, *Wh.*—*S. lacustris* L. Near Bare, *F. A. L.*, and elsewhere. — *S. Tabernæmontani* Gmel. Abundant near Bolton-le-Sands, &c., 1893, *Wi.*—*S. rufus* Schrad. Salt-marsh at Bolton-le-Sands, 1892, *Wi.*

Rynchospora alba Vahl. Cockerham Moss, 1877, and again in 1887, *Wi.* Now probably extinct, as also *Drosera anglica* Huds. and *Carex limosa* L., which grew with it; the moss is now being rapidly cut up and made away with by a "Moss-litter" company.

Carex dioica L. Littledale Fell, Udale, 1899. — *C. acuta* L. Sowerby Marshes, near Garstang, 1891, *Wi.*—*C. digitata* L. Wood on limestone near Silverdale, 1888, *Wi.*—*C. lævigata* Sm. Swampy wood by the Calder, near Garstang, 1888, *Wi.* — *C. binervis* Sm. Kemple End, *F. S.*! Near Bay Horse and Garstang, *Wi.* — *C. fulva* Good. Fairsnape Fell, 1891, Bleasdale and Roeburndale, *Wi.*—*C. Œderi* Ehrh. (*fide* Kukenthal). St. Annes, 1897, *Wh.*

**Phalaris canariensis* L. Ballast near Morecambe, 1899, *Wh.*

Catabrosa aquatica Beauv. Near Borwick, 1888, and Garstang, *Wi.*

Melica nutans L. Rough limestone ground in a wood, Silverdale, 1888, *Wi.*

Poa compressa L. Wall near Preston Wives, Longridge, 1899, *Wh.*

Festuca uniglumis Soland. St. Annes, 1897, *Wh.* — *F. sylvatica* Vill. On limestone, Ease Gill, near Leck, 1888, *Wi.*—*F. elatior* L.

Melling, Borwick, and Ease Gill, 1888, *Wi.* — *F. pratensis* Huds. Near Cowkins, Lower Hindburn, 1887, *Wi.*

Agropyron caninum Beauv. Side of Leck Beck, *Mr. L. Petty.* Between Wray and Lower Salter, 1887, *Wi.* — *A. pungens* Roem. & Schult. var. *littorale* Reichb. Bare, *F. A. L.* Fleetwood, Glasson, Preesall, &c.

**Hordeum murinum* L. Preston Docks, 1899, *Wh.*—*H. maritimum* Huds. Near Lytham, 1883, *Wi.*

†*Hymenophyllum unilaterale* Bory. Windy Clough, Clougha Scarr, 1881, *Geo. Stabler.*

†*Asplenium marinum* L. On the coast of the North district, 1884, and since, *Wi.* We deem it prudent to withhold exact locality.

Cystopteris fragilis Bernh. var. *dentata* Hook. Leagram, *F. S.*

†*Polystichum lobatum* Presl. Hodder Banks, *F. S.* !, and elsewhere.—*P. angulare* Presl. Buck Banks, Leagram, *F. S.*

†*Phegopteris Dryopteris* Fée. Dean Brook, &c., *F. S.* Hindburn, *Wi.*

†*Botrychium Lunaria* Sw. Garstang, *Wi.*

Equisetum hyemale L. Bank of Lune, near Halton, 1899, *Wi.*—*E. variegatum* var. *arenarium* Newm. St. Annes and South Shore.

A PLEA FOR MY 1737 PROPOSAL.

By Dr. Otto Kuntze.

In the last number of this Journal its Editor opposed to my new proposal that the 1737-starting-point be valid for genera, 1753 for species, with future exclusion of all intermediate works, as being arbitrary and directed against Linnæus' *Corollarium* 1737, *Genera Plantarum* of 1742, and his *Systema* of 1740 and 1748. But that is a mistake.

I agree with the Editor that it would be an unfair proposal to exclude these works of Linnæus; but that objection does not touch me at all, for I thoroughly worked up the nomenclature of these works, so that there will be found scarcely a further case out of these works for changing a name. This objection aims to those who begin with 1753 and neglect thereby all these works of Linnæus. By my proposal to exclude *further* intermediate works between 1737 and 1753 I only intended to make a concession to the numerous botanists who like to exclude the works of Rumphius, of Burmann (1737, 1738) and other contemporaneous authors of 1737–1753, who had other principles than Linnæus. Even the many Genera dubia of Linnæus in his *Hortus Cliffortianus*, page 438–439, under "Oidea," and in his *Flora Zeylanica*, p. 188–240, under "Obscuræ," "Barbaræ," and "Dubiæ," as far as they are not yet clear and accepted, were wished by most authors to be excluded.

What numerous botanists wish to do, and even the Editor of this Journal does (he does more by excluding all works before 1753), cannot appear unfair or inconsistent with sound principles.

By my proposal are excluded only the doubtful cases of nomenclature; such it will avoid future changements in nomenclature and produce more stability.

It is inconsistent to begin, as the Editor proposes, only with Linnæus' *Species Plantarum* 1753 and to use notwithstanding also Linnæus' *Genera Plantarum* of 1752, which is moreover an illicit reprint by Ch. K. Strumpf-Halle.

In the Editor's defence of his 1753-starting-point against my ciphers proving *statistically the horrible noxiousness* of the 1753-proposal I cannot find any substantial fact, I find therein only not proved probality and suppositions. But words alone cannot reject my statistical proves. I beg for careful scrutiny and do not fear it.

It is true that numerous specific names of my *Revisio Generum* have not received general use in England; but that is no argument against my new proposal concerning only genera. It is not my fault that English botanists maintain a private rule as to species-names, if a species is transferred to another genus or if the genus-name is to be changed. In the contrary I had to follow the strict priority of the international Code of 1867. This isolation of English against international laws is neither scientific nor conductive to uniformity in botanical nomenclature. English should rather do their best in the year 1900, as there will be no other opportunity for long times, to reinstitute intermittent and real international Congresses for settling different questions and such producing international harmony and understanding in botany.

That can be done now at the botanical Congress at Paris 1–10th October 1900. As I proposed in the addition to article 70 of the Codex emendatus (see Rev. Gen. III[II]. p. 166 and its motivation p. 197–198 of the introduction) the votes of such members of a Congress who belong to the inviting people, should be reduced to one-third, otherwise the Congress can never become really international. By the lack of such a practice the international Congresses were tried to be abused and lost their attraction. The members of the inviting people are always in stupendous majority at such Congresses and can easily outvote the invited foreigners. I am sure that insane practice could be removed and a better one instituted for the next century, if only the managers of the Paris scientific Congresses would be animated to settle the matter in the sequent manner and obliging thereby future Congresses in this practice, viz. :—*In scientific Congresses the members of the inviting people give honorary places of the first rows and two-thirds majority to the invited foreign members.*

Such it could easily be seen, if the majority of a votation is doubtful and such the Congresses would become really international and also more visited by foreigners. The new institution of intermittent botanical Congresses, perhaps every three years, with the obligation that each Congress has to choose the next one with its preparing directors—a practice neglected by the Madison Congress—could then be settled on such an arranged Congress at Paris next October.

[Dr. Kuntze is in error in supposing that authoritative value was claimed for the 1752 edition of Linnæus's *Genera Plantarum*: our words were, "The 1752 and 1754 editions of the *Genera Plantarum* are available *as informal or further assistance* to clear up doubts."

The first volume of the *Species Plantarum*, May, 1753, is taken as the starting-point for the names of species, and these names necessarily involve the names of genera; it is then tolerably obvious that it tends to the preservation of the former names to take the same starting-point for the latter. These original names are of very high scientific interest and importance, and each of them may be said generally to be worth many modern names. The settled practice of several botanists shows that the adoption of this principle is quite feasible, and that no practical inconvenience or difficulty is caused by the want of generic definitions in the *Species Plantarum;* moreover, according to modern codes, the name of a genus does not fail merely for lack of precise definition, if a species of it is described. Thus Dr. Kuntze, Rev. Gen. Pl. iii. 2, p. 275 (1898), revives *Jryaghedi* L. Fl. Zeyl. p. 230, n. 590 (1747); this name is placed by Linnæus near the end of his volume, under the heading "ANNIHILATÆ *sunt plantarum zeylanensium nomina, quæ soni prætereaque nihil*"; it was there given without any generic definition, and this barbarous name was apparently not intended by Linnæus to rank as the scientific name of a genus; at all events, in 1898 it was made to supersede *Horsfieldia* Willd. Sp. Pl. iv. 2, p. 872, n. 1852 (1806). Dr. Kuntze's present proposal includes, as a consequence (so far as its date is concerned), the retention of this change, since it has already been done, though it bars for the future all changes of names dependent upon dates between 1737 and 1753; surely it would be best to bar such names altogether. As an illustration of the inconvenience attending the continental plan of insisting in all cases on the perpetual sanctity of trivial names, regardless alike of Linnean usage and of common sense, we observe that this plant, the *Myristica Iryaghedi* Gaertn. or *Horsfieldia odorata* Willd., now receives the name of *Jryaghedi Jryaghedi* O.K.

It may fairly be urged that, whatever starting-point is taken, the permission to use names not previous to it should be free to all botanists and at all subsequent times. The necessity or expediency of having to draw an artificial demarcation of modern date, between the permission and the refusal for taking up old names, has a very awkward look, and throws a strong suspicion on the principle so treated.

With regard to the Paris Congress, particulars of which will appear in the forthcoming number of the *Bulletin de la Société Botanique de France*, we are in a position to state that it is hardly likely that questions of nomenclature will form part of the provisional programme, although they may be introduced by consent of the Congress itself. In any case, however, it is certain that nothing which could be called a Congress on Nomenclature will be held: Dr. Kuntze's suggestions, therefore, are somewhat premature.

It may be well to add that we are not prepared to devote unlimited space to the discussion of details connected with the nomenclature question, for which reason we refrain from comment upon certain other portions of Dr. Kuntze's communication, although we do not accept his inferences.—Ed. Journ. Bot.]

IMPATIENS ROYLEI IN ENGLAND.

By James Britten, F.L.S.

In the *Botanical Magazine* for April last (t. 7647) Sir Joseph Hooker figures and describes, under the name *Impatiens Roylei* var. *pallidiflora*, a form of a plant which has long been familiar as self-sown in London gardens, where it is known as "Tree Balsam." One species of the genus (*I. biflora*) is already completely naturalized in this country, and another (*I. parviflora*) is fully established in certain localities; and as it seems likely that to these, which are already in our books, and have come to us respectively from North America and Russia, a third introduction—this time from the Himalayas—may have to be added, it may be worth while to transcribe Sir Joseph's note upon the plant which he figures. He writes:—

"The plant here figured . . . . appeared for the first time in the shrubberies of my garden near Sunningdale three or four years ago, and rapidly increased, so as to become a weed, until 1898, when the long-continued drought decimated the plants, and prevented the seeding of the few that were spared. How or whence it was introduced I cannot form an idea. I have never raised an Indian Balsam in my garden, nor had I at that time received the seeds of any, and it is not in the Kew collection, or in that of other botanical gardens to which I have directed inquiries. On the other hand, I have seen it in several cottage gardens, one at Marlow being the nearest to my place (about fifteen miles in a straight line). Also I saw it growing in profusion in a cottage garden near Mr. Mitford's residence, Batsford Park, Worcestershire, but not a specimen of it was to be found in that gentleman's fine garden, or in his magnificent miscellaneous collection of hardy trees, shrubs, and herbaceous plants, where *I. Roylei* abounds in a naturalized state. In stature, foliage, inflorescence, flowers and fruit, my plant altogether agrees with one which I found in the upper valleys of the Sikkim Himalaya, and of which I made a coloured drawing on the spot, differing only in having subulate stipuliform glands, whereas in the Sikkim plant these are flat or pulvinate."

The following notices show that the plant has been noticed in England for nearly half a century. In the *Phytologist*, i. 166, N. S. (1855) Mr. Irvine says: "We have been informed that a Balsam twice as tall as the *Impatiens fulva*, with a stem as thick as a common broom-handle, grows on the Colne between Harefield and Denham. . . . . We had our information from the keeper of Old Park Woods,

Harefield"; and later (vi. 544, 1863) writes that *Impatiens glandulifera* "manifests some inclination to be one of our spontaneous productions at probably no very distant period," adding that he expects the plant of the Colne to be this species. It is no doubt the same plant to which Mr. Grindon (*Manchester Flora*, 99 (1859)) refers to as "*Impatiens coccinea*"—which he describes as "a tall and weedy plant, with flowers of a dull red colour, rapidly disseminating itself, growing, like its congeners, whenever a seed is dropped." Mr. Grindon wrote to me in 1864:—

"I have seen it within the last four or five years in various parts of England; and on enquiry who sowed it, or where it came from, no one knew. Many town gardens in Manchester and the neighbourhood contain it; not sown, the people tell me. I have seen it under the same circumstances at the sea-side places on the coast of Lancashire, especially at Lytham, and also not far from the famous old habitat of the American *Œnothera biennis*. No one would grow the plant for its beauty, for it is a cumbersome and weedy thing at the best" (see *Naturalist*, ii. 49 (1865)).

I do not find that the plant is recorded in recent British floras, except in that of Berkshire, where Mr. Druce (p. 123) gives three localities for it. Nor is it found in such continental floras as I have consulted, save in Garcke's *Illustrirte Flora von Deutschland*, p. 122 (1895), where it is entered as "verwildert hin und wieder." Mr. S. T. Dunn, who has paid attention to introduced plants, tells me that in a lane near Chilworth, Surrey, this Balsam seemed to have established itself and to spread freely; and that Mr. Burkill has seen it at Scarborough under somewhat similar conditions.

I have not had an opportunity of comparing living specimens, but, so far as the figures enable one to judge, Sir Joseph Hooker's var. *pallidiflora* is found equally with the type of *I. Roylei* in London gardens: the species varies greatly in size, and in the colour and to some extent in the shape of the flowers.

SHORT NOTES.

Hants and Dorset Euphrasiæ.—While botanizing in the New Forest last summer, I came across an interesting eyebright which was growing in a damp grassy situation near Holmsley Station. Mr. Townsend has seen specimens, and considers it to be a form of *E. Rostkoviana*. I know of no definite record of this for v.-c. 11; although in the monograph (Journ. Bot. 1897, it is noted from Kingsclere, North Hants (1853), the recorder is not cited. On June 6th I found an abundant growth of *E. brevipila* on the cliffs between Swanage and Studland, Dorset; apparently not previously noted for this county. In company with Revs. E. F. Linton and E. S. Marshall, I had previously gathered it near Corfe Castle. Two or three other forms were obtained, but were too young for satisfactory determination.—A. B. Jackson.

Warwickshire Mosses.—During a six months' residence in Warwickshire, two years ago, I paid some attention to the county bryology. The following localities for the mosses given are additional to those in Mr. Bagnall's *Flora*, and also to the supplement published in the *Midland Naturalist*, 1892-3. I have to thank my friends Messrs. J. E. Bagnall and H. N. Dixon for much kind help in determining doubtful material:—*Dicranella varia* Schp. Canal-bank, Shrewley Tunnel.—*Dicranum Bonjeani* var. *rugifolium* Bosw. Bog in Sutton Park. This appears to be nothing more than a form of the type with leaves somewhat contorted or crisped, and a good deal more strongly undulated than usual. It has more than once been gathered for *D. undulatum* Ehrh. (see Journ. Bot. 1874, 175). —*Dicranoweisia cirrata* Ldb. Old Milverton churchyard-wall.—*Barbula cylindrica* Schp. Canal-bridge, Radford Semele (barren). —*B. vinealis* Brid. Stone coping, New River walk, Leamington (barren).—*B. revoluta* Brid. Sparingly at base of tree-trunk near Radford Semele. — *B. tophacea* Mitt. A few barren plants found among tufts of *Bryum cæspiticium* near Rugby; pointed out to me by Mr. Dixon. — *Zygodon viridissimus* R. Br. Tree-trunk, Radford Road. — *Bryum inclinatum* Bland. Abundant on wooden piles in canal near Warwick Workhouse; Sutton Park. — *B. murale* Wils. Bridge near Hatton. — *Mnium hornum* L. Abundant in the shady parts of Warwick Castle grounds.—*Thuidium tamariscinum* B. & S. Yarningale Common (barren). — *Camptothecium lutescens* B. & S. Bank near Rugby. — *Brachythecium glareosum* B. & S. Grassy bank near Rugby. — *Eurhynchium striatum* B. & S. Very fine but barren specimens in a wood at Stoneleigh. — *E. murale* Milde. Sparingly near the main drive, Warwick Castle grounds. — *Plagiothecium sylvaticum* B. & S. Hedgebank near Leamington. — *Amblystegium filicinum* De Not. Very fine and typical in a ditch at Harbury.—*Hypnum stellatum* var. *protensum* B. & S. Grassy bank near Rugby. — *H. cuspidatum* L. Curious submerged form in pool near Yarningale. — *Hylocomium splendens* B. & S. Railway bank, Harbury.—A. B. Jackson.

Note on Hibiscus clypeatus L.—*H. clypeatus* was first described binominally in the *Systema Naturæ*, ed. 10, p. 1149 (1759), where it is based on Plumier's *Icones*, 160, f. 2, which leaves no doubt as to the identity of the plant. *H. tomentosus* Miller appears in the eighth edition of the *Gardeners Dictionary* (1768), and is founded on a Sloanean plant: "Malva arborea, folio oblongo, acuminato, veluto, dentato, leviter sinuato, flore ex rubro flavescente" Sloane, Cat. p. 95 (1696); Nat. Hist. Jamaica, i. 216, t. 135, fig. 1 (1707). We have Sloane's specimens (Herb. Sloane, iv. f. 44) and also specimens sent to Miller from Jamaica by Houstoun in 1730. Lunan (Hort. Jamaicensis, p. 469 (1814)) describes the plant, and states, "It grows but rarely in the island of Jamaica, in coppices near the coast. Its common name is *Congo mahoe*, the negroes affirming that it came originally from Africa." Sloane (*l.c.*) states, "It grew on the Red Hills over against Mr. Batchelor's House very plentifully." There can be little doubt that it is identical with *H. clypeatus*, with which it had already been placed

(in the National Herbarium) by Mr. J. J. Bennett. *H. tomentosus* is omitted by Macfadyen from his *Flora of Jamaica*, and by Grisebach from the *Flora of the British West Indies*. *H. tomentosus* Stahl (*Estudios para la Flora de Puerto-Rico*, p. 92 (1884)), although agreeing in some points, can hardly be Miller's plant, to which it is doubtfully referred in the *Index Kewensis*, as it is described as belonging to the section *Furcaria*.* *H. clypeatus* L. occurs in Porto Rico, as it was recently gathered there by P. Sintenis, No. 3700. *H. Berlandierianus* Moricand does not appear to me to differ from *H. clypeatus*. The three plants are retained as distinct in the *Index Kewensis*.—E. G. Baker.

Cracca virginiana (pp. 11–16).—Dr. Robinson kindly points out to us that our conclusions as to this name are invalidated by our having overlooked the practice, in which we fully concur, that, in cases where two plants have been confused under one name, the first author who segregates them has a right to choose which portion of the aggregate should retain the original designation. In the present instance, although, as we have stated, the first four of the five synonyms cited by Linnæus for his *Cracca virginiana* belong to the plant now known as *Tephrosia* (or *Cracca*) *spicata*, it is the fifth Linnean synonym that is cited by Persoon, who established *T. virginiana* as the type of Linnæus's *Cracca virginiana*. Moreover, Walter, who was the first to separate the two plants, clearly indicates by the character on which he bases his *G.? spicata* that he accepted as the type of Linnæus's *virginiana* the plant commonly so regarded. We regret that by our inadvertence we have added an unnecessary synonym to a plant already overladen with these appendages, although we venture to think the information supplied as to the history of the two plants in question is not without interest. The substitution respectively of "Cracca spicata O. Kuntze" and "Cracca virginiana L." for the headings "Cracca virginiana L." and "Cracca holosericea" on pp. 15, 16, will leave the synonymy accurate.—James Britten; E. G. Baker.

NOTICES OF BOOKS.

Observations on the Colors of Flowers. By E. Williams Hervey. New Bedford: Anthony & Sons. 1899. Pp. 105.

Mr. Hervey, rejecting previous theories of flower-colouration, has produced, as the result of his observations, one of his own, which is certainly not deficient in boldness and originality. The hues found in various blossoms are, he tells us, the result of chemical action blending the simple tints originally put by Nature on her palette. Insects have been main agents in working out this

* "Esta especie de Hibiscus perteneciente á la sección *Furcaria* no aparece descrita en ningún autor, así no dudo sea una nueva especie, y aunque la doy el nombre especifico de *tomentosus* espero que esta clasificación provisional sea confirmada por botánicos mas competentes."—Stahl, *l. c.*

result, not, as others have taught. indirectly, by helping those flowers which suit their taste, but directly, developing colours latent in the blood of the plant by stimulating or tickling the surface which they touch on their visits, "same as a little friction or a pinch will bring the blood to the cheek and cause a rosy tint" (p. 58). This idea is worked out in detail in a number of particular instances, and is thus summarised by its author (p. 74): "Figuratively speaking, the special markings on the petals of flowers are the footprints of the bees and butterflies. When they follow the same route for nectar, they leave a trail; when the butterflies walk around the stamens of a pink, they leave the impression of their tiny feet in the shape of a circle; when a bee rubs his back against the petals of a poppy, he makes a similar-shaped [black] spot on each; and when with his tongue he laps the nectar on the petals of the tulip-tree, he paints a golden band; when he falls to the bottom of the cup-shaped tulip, he in his scrambling describes a disc of blue or yellow." It will thus be seen that explanations can be found for everything at a moment's notice, with a facility which even theorists do not usually enjoy.

Mr. Hervey also repudiates very strongly the notion, proclaimed as fundamental by Sir John Lubbock, Mr. Grant Allen, and others, that there is any sequence or order of merit amongst colours, or that insects prefer one to another; "they all seek honey wherever it can be obtained, colour or no colour" (p. 78). Moreover, he declares, not only that "honey-guides do not always guide" (p. 59), but that in the case of the poppy the "black honey-guides are of no value as real guides [especially, it should be added, as poppies contain no honey]; they serve to decorate the petals, and that is all; and this is all that half of the spots or guides are good for!" (p. 67). Again, we learn that some insects, of weaker intelligence, alighting on the wrong part of *Tropæolum* blossoms, are debarred by "a sort of *cheval-de-frise*" from getting at the honey, but, nevertheless, repeat the blunder so habitually as to "stimulate just the same," and leave a monument of their folly in the shape of spots of colour.

It is obvious that on such a theory we should not speak of honey-guides at all, but rather of the tracks of creatures who knew how to reach the honey without them. But how does Mr. Hervey square this account of the matter with some of his own examples? He tells us, for instance, that the white snowflake (*Leucojum*) has green-coloured honey-guides, and also that, undoubtedly, green was the original colour of the whole blossom (p. 60); therefore it would seem that the new colour has been developed only where the insects did *not* stimulate. Still more to the purpose would it be to enquire how an insect, with six sprawling legs and feet, could walk along a streak as fine as a thread; or why he should always try to walk along these particular streaks, which offer no possible advantage. Why, again, were their limbs never so delicate, should bees always tread so persistently on the same spots as to develop the freckles of the foxglove? Again, what manner of insect evolutions can have painted the fritillary?

J. G.

The North American Slime Moulds. By Thomas H. Macbride. New York: The Macmillan Co. 1899. 8vo, pp. xvii, 231; tab. xviii.

The Mycetozoa, and some Questions which they suggest. By the Rt. Hon. Sir Edward Fry and Agnes Fry. London: Knowledge Office. 1899. 8vo, pp. viii, 82; 22 figs. Price 1s.

It is quite easy to understand the popularity of the Mycetozoa. Since De Bary's revelation of their life-history, no biologist has been able to keep them for long out of his thoughts. Nothing could well have been more tantalizing than that Rostafinski should thereupon have proceeded to bury his magnificent monograph in the Polish language. Dr. M. C. Cooke, it is true, translated it so far as it concerned then known British species. In spite of the work of Mr. Massee and others, we had nothing satisfactory during many years, until Mr. Arthur Lister's Monograph, of which it is unnecessary here to say anything beyond the well-known fact that it cleared up a not very creditable mess, and obtained a practically universal vote of thanks for a long, toilsome, and splendidly lucid contribution to systematic natural history. The stimulus of this *Monograph* and of the author's *Guide* to the British species (both published by the Trustees of the British Museum) can be best indicated by the phenomenal sale of both books, though neither were cast in popular form. I am well aware that in these pages it is rank heresy to say so, but among students of the lower cryptogamous groups that escaped Linnæus and other early fathers we have had re-incarnations of Linnæus many times. The names of Agardh and Fries, for example, illustrate my meaning, and though in the interest of universal order and method we must think of them (as of Rostafinski in the present case) as they took themselves, basing their work on Linnæus and the Linnæan method, the reflection yet explains the temptation to go quite wrong in matters of nomenclature which has at all times beset cryptogamists. We had arrived then at a period when the work of Lister had set in order those things which were painfully confused and obscure in a group where confusion and obscurity appeared to be its natural lot.

Prof. Macbride, who has long been one of the hardest workers at the Mycetozoa, set himself to get the North American forms into order, including among them what most botanists prefer to call Central American forms—everything northwards from Panama. His book testifies on every page to his industry in gathering up the material, to his admirable power of writing good descriptions, and in many minor ways to his fitness for undertaking this task. In the presence of these excellent qualifications and performances it does go against the grain to find fault. It sometimes seems that the author has a positive itch to do things contrary to rule and common sense. Take the title-page. Why call them "Slime Moulds," especially as the author takes some trouble (which is surely now quite unnecessary) to point out how little they have in common with the Fungi? I prefer Sir Edward Fry's "Myxies," which is at least non-committal, or, better still, "Creepies," which

may, or may not, have been published, but has certainly come into use as a handy vernacular name. But this is a small matter. The principal fault of the book is undoubtedly the non-acceptance of the De Candollean laws, the adherence more or less to the present zoological method, and the resulting confusion after all such troubles had been laid, as one hoped for ever, by Mr. Lister's monograph. One is tempted to take some of these instances and make example of them, but this would end in reviewing nomenclature questions, as has been done so efficiently and so frequently in these pages, and in parting from the main business of reviewing this book. Enough has been said to show that the author, so far from being thankful for the great reform of the Lister Monograph, has deliberately taken a backward step in a very important point. One is also constantly irritated by seeing personal specific names, which are exceptionally numerous in the Mycetozoa, printed with small initials, as "sauteri," "trevelyani," etc., in the fashion of zoologists. Apart from matters of nomenclature, a fault of the book appears to me to be a rather liberal notion of specific rank—again, I should say—a backward step, but here I feel I am on dangerous ground. These things are subjective. A few strange errors occur, notably the author's unaccountable belief that the capillitium is formed after the spores. There is so much that is good, worthy to live, and utterly honest in this book that criticism, such as this, becomes particularly painful.

It is many years since I have met with any natural history reading so fruitful and so good as the small book of Sir Edward and Miss Agnes Fry. They have studied their "Myxies" as they have plainly studied many other groups of organisms. They have set an aim before them to give a good readable account of the group, not only in plain words, but with commonly intelligible verbal illustrations, and they have succeeded in producing an almost perfect example of what such a book should be. They lay the realm of Nature freely under contribution for good analogies and homologies. I confess it is not so much their treatment of the Mycetozoa as the "Questions which they suggest" which interest me. Let even the most litigious among us reflect soberly on the mess we should, and do, make in intrepreting the laws of human enactment; and let us further reflect that one of the authors of this book is justly renowned among even the most historical expounders of these laws; let us struggle to grasp at the mental condition of Sir Edward Fry turning from a lifelong study of these laws to a study of biological phenomena and natural laws. No man living, or that ever lived, expressed more clearly than Mr. Huxley the definition of such laws. I cherish the recollection of expounding this definition at second hand during a casual, midnight meeting of two fishing-boats on the broad bosom of Loch Goil, to a notorious "free-thinker," as he called himself, who thought the laws of Nature were of a compulsory character. He was quite clear, of course, from his own experiences, that laws of human enactment had no compulsory force; that they did not make you pay your taxes, but only told you what happened to you when you failed to do so. But he appeared to be inaccessible to the idea that laws of

Nature were merely human assertions as to the invariable order of events. This is, I hope, a pardonable and elementary digression. Sir Edward and Miss Fry, on the text of the Mycetozoa, raise questions of the most far-reaching biological importance. It is done with the most consummate appreciation of botanical research. In one or two matters, however, I must correct.

The authors cite the experiment of Falkenberg yielding the barren result of attempted hybridization of *Cutleria adspersa* and *C. multifida* as impressing "the mind with the fundamental character of the fact of species." Surely, as a mere matter of argument, it would be easier to overthrow the "fact" of species than to support it; but hybridization is like "what the soldier said"—not evidence. If it were, let us bring the argument within the fence of hybridization—futile though it be. Take the nearly-allied case of Thuret's experiments with *Fucus*. A hybrid was obtained between *F. vesiculosus* ♀ and *F. serratus* ♂, while *F. vesiculosus* ♂ could not fertilize *F. serratus* ♀. In the light of this evidence (and much more of the kind of greater cogency), such arguments do not impress the mind with the fundamental character of the fact of species. Let me make another quotation: "In the Algæ the presence of colours other than green is found a fundamental character in their classification, and in like manner we shall find in the myxies that the colour of the spores has been found a character of real value." That such a comparison of colour characters is admissible for a moment no botanist will agree. The colour characters of the Algæ are absolutely things by themselves—in no respect comparable with any other colour characters in nature—and, so far as classification goes, they are the basis of an artificial system merely, though, from the nature of the case, a better one than any other colour classification. That there are enormous advantages to be derived from subjecting our arguments to a mind trained in the highest judicial exercises is obvious to all, and especially to those who have spent a day or two in reading Sir Edward and Miss Fry's essay, but I submit that the whole evidence is not before them. So far as argument and fact known to the authors go, there can be nothing more conclusive, or instructive. The authors' reflections on the immortality of unicellular plants strike me as most clear and suggestive comments on a subject obscured by Weismann. One of the charms of the book is the delightful lucid style. One must go to the masters of English prose for a comparison.

Let me, finally, for the sake of usefulness, correct a small error. The authors advise readers to get Mr. Lister's *Guide* at "South Kensington Museum." I was about to write "there is no such place," but I recall the dangers of debate on what is a "place." It is to be obtained at the British Museum (Natural History), Cromwell Road, S.W. "South Kensington Museum," now the Victoria and Albert Museum, is, as I need not say, another institution.

G. M.

On New Zealand Hepaticæ. By Dr. S. Berggren. Part I. Sweden, Lund: E. Malmström. 1898. 4to, pp. 48, with 32 figures in the text.

The Hepaticæ and Anthocerotes of California. By Marshall Avery Howe. (Memoirs of the Torrey Botanical Club. Vol. VII.) New York, 1899. Pp. 208; plates 88–122. Price 3 dollars.

The long-continued output of novelties in the rich Hepatic Flora of New Zealand remains unbroken. Since the monograph of the group in Hooker's *Handbook of the New Zealand Flora* in 1864 many new species have been added by Stephani, Mitten, Colenso, and others. But their descriptions, scattered as they are for the most part through European periodicals, are difficult of access to the native botanists, who are hence placed at a disadvantage in their study of the group. These students are likely to derive much assistance, however, from Dr. S. Berggren's *On New Zealand Hepaticæ*, the first part of which treats of fourteen genera, comprising thirty-four species, of which seventeen are new. Five of these genera are of the interesting but difficult type which matures the capsule in a subterranean pouch (*marsupium*); and associated with these is *Marsupellopsis*, which for the first time attains generic rank. The illustrations are a valuable feature; for discrimination of the Hepatics depends so much upon the subtle curvature and elaborate outline of the leaves, that even a simple line-drawing is more readily understood than a wealth of letterpress garnished with adjectives, however picturesque and well-chosen they may be. The author describes his own collections made twenty-five years ago in the North and South Islands, and gives full and critical notes in good English. On pp. 39–41 he adds some interesting remarks on methods of dispersal of Cryptogams in the southern regions of the globe.

In the United States the home-study of the native cryptogamic flora has for years been developing, and the publication of several critical monographs on moss-genera shows how popular a subject of investigation the Mosses have become. That a due amount of attention is accorded to the Hepatics also we have ample evidence in Mr. M. A. Howe's *Hepaticæ and Anthocerotes of California*. This work is well calculated to stimulate further active research, not only in the States, but also in California itself; for the author in his interesting introduction points out that the region with which he deals presents a striking diversity of climatic conditions, and that the great range of the Sierra Nevada is still almost a *terra incognita*, so far as its bryology is concerned. And he anticipates that the present total of eighty-six species may be nearly doubled. The eastern and northern States, with an area five times as large but proportionally less productive, have a record of one hundred and fifty species. Three pages of distribution-tables are provided, and afford a good idea of the peculiarity of the Californian Hepatic-flora. *Inter alia* we learn that, while only thirty-seven of the species occur in the eastern and northern States, as many as forty-six are found

in Europe. Indeed, the affinity of the Californian with the Mediterranean region is quite remarkable, and suggests to Mr. Howe the possibility of some land-connection in prehistoric times. Such species as the recently discovered *Geothallus tuberosus* and *Anthoceros phymatodes*—morphological novelties—are notable for their tubers, which enable them to maintain existence during long periods of drought. The *Anthocerotes* are, for good and sufficient reasons, based upon morphological researches of Prof. D. H. Campbell and others, raised to the rank of a class co-ordinate with the rest of the Hepatics.

Mr. Howe's descriptions and notes are fully and carefully drawn; and his system of keys to the genera and species cannot fail to enhance the utility and popularity of his work by eliminating at the outset a defect which so often impairs the value of ordinary handbooks. Pursuing a policy of thoroughness, Mr. Howe gives us an index and fifteen pages of bibliography. The thirty-five excellent plates supply delineations of species which have never, or only imperfectly, been figured hitherto. Four new species, two of which are *Ricciæ*, and two new varieties are described.

A. G.

Graminées. Descriptions, figures et usages des Graminées spontanées et cultivées de France, Belgique, Iles Britanniques, Suisse. Par T. Husnot. Folio, pp. viii, 92; tt. 33. T. Husnot, Cahan, par Athis. 1896–1899. Price 25 francs.

We have received the fourth and last part of M. Husnot's 'Grasses.' As the title-page bears merely an inclusive date, and as there is nowhere any more satisfactory statement of the period of appearance of the individual parts than the addition of a pencil figure to the "189" on each, it may be well to give the dates at which they were received by the Department of Botany. They are as follow:—

Part 1. Pp. 1–24; tt. 1–8. Oct. 31, 1896.
Part 2. Pp. 25–48; tt. 9–17. June 23, 1897.
Part 3. Pp. 49–72; tt. 18–24. Dec. 3, 1898.
Part 4. Pp. i–viii (including title-page), 73–92; tt. 25–33. Nov. 27, 1899.

The book as a whole is of a very awkward shape both for use and storing. The working botanist naturally turns to the plates; for in the grasses plates are more than ever useful—in fact, are a necessity in the determination of species. And here he will be disappointed. Some are better than others; those in the last part, for instance, are an improvement on those in the third; but, as a whole, they are poor and inadequate for the purpose. For instance, *Digitaria sanguinalis* on plate iv. is hardly recognizable, and the common *Cynodon Dactylon* close by is almost as bad. We fully sympathize with the author, who is also draughtsman and lithographer, in his inability to find in Caen a good printer for his lithographs. "The English," M. Husnot states, "publish almost always coloured plates, because the whole world is included in their *clientèle*. In France, where only true naturalists buy, less costly black plates are preferable." M. Husnot also draws a pathetic

contrast between the wide circulation of special scientific publications in this country and the restriction merely to those who actually need them in his own. We trust that he will not be embarrassed by a too restricted sale in the present instance, but we do not feel justified in warmly recommending his book to British botanists.

A. B. R.

Caroli Linnæi. *Hortus Uplandicus, med inledning och förklaringar.* Inbjudningsskrift till afhörande af den offentliga föreläsning med hvilken professoren i anatomi medicine doktorn Johan August Harald Hammar tillträder sitt embete af Th. M. Fries, Kongl. Universitets i Upsala n. v. rektor. [Upsala, 1899.] 8vo, pp. 38, xlviii. v. [with a facsimile of the title-page, and plan of the Upsala garden].

Professor Fries is continuing his contributions to our knowledge of the early life and work of the elder Linnæus; eight contributions have already appeared, and this may be taken as virtually the ninth. This particular MS. of the *Hortus Uplandicus* has not been printed before, and it is interesting to compare it with the other versions, five of which are enumerated thus:—

No. 1, without date, but probably written in the early summer of 1730; this is in the library of the Linnean Society of London.

No. 2, with a Swedish dedication, dated 29 July, 1730, to O. Rudbeck the younger; it is now at Leufsta.

No. 3, the same date as No. 2, but with a Latin dedication to Rudbeck. This copy was sent by Linnæus to Professor J. J. Lange, in Halle, to endeavour to get it printed and published in Germany, evidently without success; at the end of last century it was in the possession of Schreber, Linnæus's pupil, at Erlangen: it was then lost sight of, and finally was discovered in the State library at Munich; in 1887 it was lent to the University of Upsala, where it was transcribed, and verified as being in the handwriting of Linnæus.

No. 4, dated 13 May, 1731, Old Style, Linnæus's birthday; now in possession of Pastor Johanson.

No. 5, title changed to *Adonis Uplandicus*, 13 May, 1731, Old Style; now at Leufsta.

With the exception of the third, all these MSS. were printed in Ährling's posthumous *Carl von Linné's Ungdomsskrifter*, Series i. 1888. This omission is supplied here, with a reduction of the early Linnean names of plants to those of the present time.

The volume contains garden plants, as well as native, and Professor Fries comments on certain points of interest, which show the trend of Linnæus's ideas as his sexual system took shape. A consideration of the then condition of the Upsala garden is next introduced, and its history under the Rudbecks, down to 1787, when Gustavus III. made a grant of it to the University.

The last section of five pages is devoted to the official announcement of Dr. Hammar's installation as professor.

B. Daydon Jackson.

*ARTICLES IN JOURNALS.**

Annuario del R. Ist. Bot. di Roma (ix. fasc. 1 : received 22 Jan.). — B. Longo, 'Sulle Calycanthaceæ' (2 pl.). — Id., 'Contribuzione alla cromatolisi (picnosi) nei nuclei vegetali' (1 pl.).—G. Lopriore, 'Amarantaceæ in Somalia lectæ.' — N. Terracciano, 'Addenda ad Synopsidem plantam vascularium Montis Pollini.'

Bot. Centralblatt (Nos. 1–4). — R. Feitel, 'Zur vergleichenden Anatomie der Laubblätter bei den Campanulaceen der Capflora.'— (No. 1 : 20 Dec.). W. Táliew, 'Zum Bestäubungs mechanismus von *Borrago officinalis* und einigen anderen Borragineen.' — K. W. von Dalla Torre & L. v. Sarnthein, 'Die Verbreitung der *Angelica verticillaris*.' — (Nos. 2, 3 : 4 & 10 Jan.). A. P. Popovici, 'Der Einfluss der Vegetationsbedingungen auf die Länge der wachsenden Zone.'—(No. 3). M. Tswett, 'Das Chloroglobin.'

Bot. Gazette ("December, 1899" : issued 10 Jan. 1900).— A. Nelson, 'Rocky Mountain *Chrysothamni*.' — J. F. Clark, 'Toxic effect of deleterious agents on certain filamentous fungi' (concl.).— C. D. Beadle, 'Studies in *Cratægus*.' — H. H. Hume, '*Puccinia* teleutospores.' — P. A. Rydberg, '*Prunus insititia*.' — G. G. Hedgcock & A. A. Hunter, 'Notes on *Thorea*' (1 pl.). — C. W. Hyams, ***Lilium Masseyi*, sp. n.**

Bull. de l'Herb. Boissier (30 Dec.: received 22 Jan.). — A. Chabert, 'Souvenirs d'Antan.'—J. Bornmüller, '*Crocus Hermoneus*.' — F. Stephani, 'Species Hepaticarum.' — E. de Wildeman, *Theobroma Kalagua*, sp. n. (1 pl.).—J. Briquet, *Agrostis rubra & Calamagrostis tenella*.

Bull. Torrey Bot. Club (22 Dec.). — E. P. Bicknell, 'Studies in *Sisyrinchium*' (cont.).—J. L. Clark, *Volutella mellea*, sp. n.—A. A. Heller, 'Plants from Western N. America.'—D. Griffiths, *Anthurus borealis*. — F. S. Earle, 'Fungi from S. America.' — J. B. Clifford, 'The Mycorhiza of *Tipularia unifolia*' (1 pl.).

Erythea (30 Nov.: received 3 Jan.).—J. M. Greenman, 'Northwestern Plants.'— M. L. Fernald, 'New Western Plants.'— W. L. Jepson, 'Teratology of *Scrophularia californica*' (1 pl.). — Id., 'Early Scientific Expeditions to California.'—C. V. Piper, *Parnassia cirrata*, sp. n.

Gardeners' Chronicle (13 Jan.). — '*Solanum Worsleyi*' (? sp. n.: fig. 5).

Journal de Botanique ("Octobre," received 23 Dec.; and "Novembre," received 8 Jan.). — A de Coincy, 'Plantes nouvelles de la Flore d'Espagne' (concl.). — L. Mangin, 'La membrane des Mucorinées' (1 pl.: concl.). — E. Camus, 'Plantes hybrides spontanées de la flore européenne' (cont.). — ("Octobre"). P. van Tieghem, 'Sur les Fouquiériacées.' — ("Novembre"). Id., 'Sur les Parnassiacées.' — E. Roze, 'Supplément à la Florule française de Charles de l'Escluse.'

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* The dates assigned to the numbers are those which appear on their covers or title-pages, but it must not always be inferred that this is the actual date of publication.

Malpighia (xiii, fasc. 5, 6: received 20 Jan.).—A. Fiori, 'Nuovo microtomo a mano con morsetta tubulare.' — A. Vaccari, 'Secondo supplemento alla flora dell' Arcipelago di Maddalena.'—E. Paratori, 'Richerche istologiche sui tubercoli radicali delle Leguminose' (1 pl.). — Id., 'L'ipotesi del Duval-Jouve sulla disposizione delle lamine fogliari di alcune Graminacee' (1 pl.).

Oesterr. Bot. Zeitschrift (Jan.). — A. Jenčič, 'Untersuchungen des Pollens hybrider Pflanzen.' — O. Richter, 'Ein neues Macerationsmittel für Pflanzengewebe.' — J. Podpěra, *Fissidens Velnovskyi*, sp. n. (1 pl.).—J. K. Urumoff, 'Zur Flora von Bulgarien' (cont.).

Rhodora (Jan.).—H. von Schrenk, *Arceuthobium pusillum* (3 pl.). —F. S. Collins, 'Notes on Algæ.' — M. L. Fernald, 'Northeastern species of *Scirpus*.'

BOOK-NOTES, NEWS, &c.

Sir James Paget, who died in London on the 30th of last December, claims a place among the records of British botanists. Born at Great Yarmouth in January, 1814, he contributed the botanical portion to a joint publication by his brother and himself, entitled *Sketches of the Natural History of Yarmouth*, which was published in 1834. The list of plants, which includes the cryptogams (fungi excepted), occupies forty-four pages, exactly half of the book, and is evidently very carefully done. His distinguished career as a surgeon diverted his investigations into other channels, but he always retained his interest in botany, and is mentioned by Mr. Watson in *Topographical Botany* as having contributed information by correspondence for Norfolk and Suffolk; he was for many years a frequent attendant at the meetings of the Linnean Society, of which body he became a Fellow in 1872. He is commemorated by Ferdinand von Mueller in the Rutaceous genus *Pagetia*.

Another even more distinguished man who demands mention in these pages, and of whom we hope to say more in our next issue, is John Ruskin, who died at Brantwood, Coniston, on Jan. 20.

Charles Grant Blairfindie Allen, who died at Hindhead on the 25th of October last, at the age of fifty-one, was an interesting writer, whose efforts of imagination were by no means restricted to the novels and stories with which his name is associated. It may be said of him, though by no means in the conventional acceptation of the phrase, that he "looked through Nature up to Nature's God," and that he treated both with a freedom which failed to commend itself to accurate or reverent minds. An estimate of the scientific value of his botanical work will be found in the notice of his *Colours of Flowers* (Journ. Bot. 1883, 59) and *Flowers and their Pedigrees* (Journ. Bot. 1884, 185); his methods are further examined in the notice of his biography of Charles Darwin (Journ. Bot. 1885, 377), and formed the subject of a pamphlet by the Rev. John Gerard called *Mr. Grant Allen's Botanical Fables*. With his friend

Mr. Clodd, from whom we may expect a sympathetic biography, Mr. Grant Allen has been regarded by many as treating what is called Darwinism in a manner suited to the popular intelligence; but it may be doubted whether Darwin would have accepted either their matter or their methods as an adequate presentment of his theories. According to *Erythea*, however, "capable judges agree that" Mr. Allen "has done more than any other contemporary Englishman to popularize in a most lucid manner the work of Huxley and of Darwin": this seems to us rather hard on the writers in question.

Sir Rawson William Rawson, who died at South Kensington on the 20th of last November, was born in London on Sept. 8, 1812. His life was spent in the Colonial Service, in which he held positions of distinction in Mauritius, at the Cape, and in the Bahamas, ending his official career as Governor of the Windward Islands, from which he retired in 1875, when he received the title of K.C.M.G. Throughout his life he had been interested in ferns; an early evidence of this will be found in the *Phytologist* for 1852 (iv. 696), where three Cheshire ferns are recorded by him. He collected in the various countries in which he was stationed, and in 1858, in conjunction with Dr. Pappe, published at Cape Town a *Synopsis Filicum Africæ Australis*. In this several new species are described, many of which were subsequently reduced by Buchanan (*Ferns of Natal*, 1875), who had access to Mr. Rawson's specimens. Besides those of his own gathering, Sir Rawson's herbarium contained a large number of specimens from various collectors; unfortunately, the collection had suffered much damage before it was acquired by the British Museum, but it contains specimens of interest in connection with species published by him.

At the meeting of the Linnean Society on Jan. 18th, Mr. George Massee read a paper on the origin of the Basidiomycetes. He remarked that Juel, a Danish mycologist, had recently demonstrated that *Stilbum vulgare*, hitherto regarded as a typical Hyphomycete, is a true Protobasidiomycete. Following up this hint, the majority of the species of *Stilbum*, some of which are the known conidial phase of species of *Sphærostilbe*, and others existing without any known higher form, were examined, with the result that the conidial condition of *Sphærostilbe microspora* and *S. gracilipes* proved to be identical in structure with *Stilbum vulgare*, in other words, true Protobasidiomycetes. This discovery reveals the fact that the conidial condition of an ascigerous fungus may be a true Protobasidiomycete. Similar discoveries had been made with forms of *Tubercularia* and *Isaria* known to be the conidial stages of ascigerous fungi.

The *London Quarterly Review* for October last contained an interesting article on "The Primrose and Darwinism" by a writer who styles himself "A Field Naturalist, M.A. Camb." The conclusion arrived at, after a careful survey of the literature of the subject, is "that the primrose gives strong confirmatory evidence to Axell's view, that under natural and equal conditions self-

fertilization of flowers is both the legitimate fertilization and the most productive."

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At the meeting of the Linnean Society on Dec. 21st, Dr. Braithwaite exhibited specimens of *Hypnum Hochstetteri* Schimp., collected by him on the Isle of Barra, Outer Hebrides, the only known locality for the plant in Europe.

We note with regret that the *Bulletin de l'Herbier Boissier* terminates its existence with the December number. Its place will be taken by *Mémoires de l'Herbier Boissier*, to be published "à époques indéterminées, en fascicules de prix variable." The first number, dated Jan. 15, contains a continuation of Prof. Schinz's 'Die Pflanzenwelt Deutsch-Südwest-Afrikas,' hitherto issued in connection with the *Bulletin*.

Dr. B. L. Robinson has been appointed first incumbent of the newly endowed Asa Gray Professorship of Systematic Botany at Harvard University.

Mr. J. B. Carruthers has been appointed Mycologist to the Government of Ceylon, and Assistant-Director of the Botanical Gardens at Peradenya.

Another fascicle of Mr. Fryer's valuable monograph of British Potamogetons has appeared. Mr. Morgan's plates are, as usual, excellent, and the publisher continues to make them inconvenient for reference by placing his own name where common sense and custom would lead us to look for that of the plant figured. The issue of several "parts" in one wrapper, which is only dated by the year, must in the future lead to inconvenience.

The impetus lately given to the study of Mosses in this country does not seem to extend to France. We note that half the first number of the *Revue Bryologique* for the present year is occupied by a paper entitled "Compe de feuilles des Glumacées," which is likely to be overlooked by agrostologists, seeing that it appears in a journal "consacré à l'étude des Mousses et des Hépatiques."

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SENIOR ASSISTANT, DEPARTMENT OF BOTANY, BRITISH MUSEUM (NATURAL HISTORY)

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POTAMOGETON RUTILUS Wolfg. IN BRITAIN.

By Arthur Bennett, F.L.S.

(Plate 407.)

I am indebted to Mr. C. E. Salmon, of Reigate, for the sight of the first British specimen that I can certainly refer to Wolfgang's species. The specimens (mixed with *P. pectinatus* L. on one sheet) are part of a collection presented to the Holmesdale Natural History Club by Dr. J. A. Power many years ago, and were detected in going over these plants to confirm the names. I advised that the plant should be left, and that search should be made for it. Mr. Salmon communicated with Mr. J. E. Bagnall, as he was more or less in the neighbourhood of both localities named on the sheet of specimens, which are, "Coventry Canal, Atherstone"; "Marl Pits, Fradley, Staffordshire." Mr. Bagnall wrote: "I am sorry to have to say that I find no trace of *P. rutilus* at either the Atherstone Canal or any of the marl-pits near Fradley. Atherstone Canal is now very bare of interesting aquatics; even those which in former days were abundant, such as *P. zosterifolius*, are quite absent now, the canal being apparently cleared recently. There are many marl-pits at and near Fradley, some of them still continuing to be more or less filled with water, the pits nearest to Fradley being mostly choked with *Anacharis*. Some of the outlying pits which I visited are either ordinary duck-ponds, and quite bare of vegetable life, or else so dried up as to be mere swamps. One I visited, which has evidently not only been of large size (about fifteen yards square, and very deep), but was formerly well filled with aquatic growth, has now only an undergrowth of *Carex paniculata* and a large overgrowth of sallows and willows. It is so long since [Joseph] Power lived in the neighbourhood of Fradley, that the physical characters of the country around are completely changed. He must have visited this district when he lived at Polesworth in the beginning of the present century, and, being a well-known man in the district, would have access to places that would not be so accessible to one like myself; although I have visited all the marl-pits I find marked on the six-inch Ordnance map, there may have been in his day some that are now filled up."

It may be that the dry season of last summer has dried up the pools near Fradley where the *P. rutilus* grew. Mr. Bagnall has promised to make another search this year.

The following is a translation of the original description of *P. rutilus* in Roem. & Schultes, Syst. Veg. Mant. iii. p. 362:—"Stem compressed, reddish, lower portion more or less branched, upper quite simple, slender; leaves all submerged, sessile, alternate, narrow-linear, flat, gradually narrowing to a mucro, spreading, 3-nerved, ruddy, obscurely biglandular; peduncles elongated; spikes 6–7-flowered, reddish; flowers alternately opposite in pairs; anthers apiculate. Wolfg. MS. n. 28. Besser *in litt.*"

The writers add:—"In our specimens, gathered by the author himself, and kindly communicated by Besser, the stems are rather compressed, flaccid, and very slender; the leaves erecto-patent, 1½ in. long, equalling or exceeding the internodes, as thick as the stem, very narrow, acute, obscurely 3-nerved; the stipules entire, lanceolate, acute, scarious, half as long as the leaves or less, broader towards the apex, opposite under the peduncles. Peduncles somewhat thickened, longer than the leaves, terminal 1–1½ in. long. Spikes very short, 3 lines long, few-flowered. Fruit wanting. In lakes and pools about Wilna. Wolfg."

I may remark on this, that, as contrasted with *pusillus*, the stipules are very much longer, the leaves are more acute, and with the aspect of *acutifolius* on a small scale; and with a peculiar habit that is not found in *pusillus*, difficult to describe, but best expressed by the term "hard," though this is somewhat lost (in drying?) in most specimens of *P. cæspitosus* Nolte; it is well shown in specimens in the British Museum Herbarium given by Nolte to Prof. Tucker-man. In no specimens gathered by Wolfgang that I have seen is any fruit to be found; but it is present on Nolte's specimens, and is well figured in Reichenbach's *Icones*. My specimens from Nolte are only in flower; in one from A. Braun the fruit is about two-thirds ripe; in specimens from Dr. Nordstedt (Ostrogothia, Sweden) the fruit is well developed and ripe. It differs from *pusillus* in being longer, narrower, the beak is more bent over, and, as shown by Reichenbach, there is a slight (sometimes greater) indentation on the upper margin, and the fruit is smoother and browner than that of *pusillus*.

The following represents the history of the species:—

Potamogeton rutilus Wolfgang! in Roemer & Schultes, Syst. Veg. Mant. iii. 362 (1827). *P. pusillus* L. var. *β*! Cham. & Schl. in Linnæa, ii. 172 (1827). *P. cæspitosus* Nolte!, ex Reichb. Ic. Fl. Germ. et Helv. vii. p. 15, t. 23 (1845); Fries, Summ. Veg. Scand. 215 (1846); Sonder, Fl. Hamburg. 102 (1851); Ascherson, Fl. Brandenb. 665 (1864); Marsson, Fl. Neu-Vorpommern, 495 (1869); Lange, Handb. Danske Fl. ed. 4, 199 (1886); Hartman, Handb. Sk. Fl. ed. 12, 54 (1889); Prahl, Krit. Fl. Schlesw.-Holst. ii. 209 (1890); Macoun, Cat. Canadian Pl. pt. 4, 88 (1888); pt. 5, 371 (1890); Morong, N. Amer. Naiad. 42 (1893); Magnin, in Bull. Bot. Soc. France, xliii. 446 (1896); Ascherson & Graebner, Syn. Fl. Mitteleurop. 346 (1897).

Exsicc.—Fries, Herb. Norm. xv. No. 74, 1853–7.

Figures.—Reichenbach, Icones Fl. Germ. vol. vii. t. 23; Flora Danica, t. 2889; Morong, N. Amer. Naiad. t. 50.

Distribution.—Sweden (in Ostrogotha!, Upland!, Bornholm!), Denmark!, Finland!, Russia, Poland, Baltic Provinces, Onega-land, Olenetz, Lithuania!; Schleswig-Holstein!, Holland (*Nyman*), Prussia!, Austria (*Nyman*), Hungary!, Switzerland?, Mecklen-burg (*Asch. & Graeb.*). Canada: Anticosti!, James Bay!, Nipigon River!. United States: New York!, Michigan!, Minnesota (*Morong*).

I agree with M. Magnin in referring *P. cæspitosus* Humnicki (Cat. Pl. de Luxeuil, 60 (1876)) and *P. reptans* Humnicki (*l. c.* 61) to *P. pusillus* L., and not to *P. rutilus* Wolfgang. These are the authority on which *P. rutilus* has been reported as a French species.

In Dr. Lees's *Flora of West Yorkshire*, p. 418, a plant is reported as growing in "clear clay-bottomed ponds at Dringhouses," which Dr. Lees names *P. pusillus* L. var. *rutilus* Wolfg.; I have not seen any specimens, but, in the case of a critical species for which forms of *pusillus* are constantly being reported by good botanists on the continent, it seems to require confirmation. In the Berne Herbarium, as I have already noted in this Journal for 1895, p. 24, there is a sheet of specimens labelled "*P. pusillus*. Ely, Cambs. 25 July, 1825, *Henslow*"; part are true *pusillus*, and part *rutilus*, but they are not mixed, so perhaps a label has been lost.

There are differences in habit between *rutilus* of Wolfgang and *cæspitosus* of Nolte, but not enough, in my opinion, to constitute a variety. Nolte's plant has much the habit of some forms of *P. Friesii* Rupr., while Wolfgang's resembles narrow-leaved forms of *P. acutifolius* Link; but in an original Lithuanian specimen from Wolfgang there is a tendency towards the habit of Nolte's plant. The way in which the specimens are dried makes some difference; the beautiful specimens I possess from Dr. Nordstedt are models of what dried aquatics should be. Richter (Pl. Europ. p. 15, 1890) most unaccountably places *P. compressus* Sm. (Eng. Bot. t. 418), *P. Friesii* Rupr., and *P. Ederi* Meyer, under *rutilus*. Of the last I have not seen an actual specimen named by Meyer, but German botanists agree in placing it under *P. pusillus* var. *major* Fries; and *rutilus* bears no likeness to *good* specimens of the plants of Ruprecht and Smith.

After writing the above, on going through all the doubtful specimens I possess of the genus, I found two sheets, received from Mr. Griffith, of Bangor, collected in Anglesea in 1892; these must be referred to *P. rutilus*. Mr. Griffith writes: "I have little doubt the specimens were gathered in Lake Coron, in Anglesea, and I shall hope next summer to gather the plants again."

Early in 1899 Mr. Hilton sent me a specimen of this, collected from a ditch near Rye, Sussex, in July, 1898. It was without fruit; but Mr. Salmon brought me a specimen of the same plant with good fruit, and the suspicion it might be *P. rutilus* was at once confirmed. This is the loose cæspitose form of the plant that is contained in the British Museum Herbarium from Nolte's collection, and of which I possess a specimen from Nolte sent me by the late Herr von Uechtritz, of Breslau. I have from Orkney other specimens that may be *rutilus*, but are insufficient for determination.

Explanation of Plate 407.—A. *P. rutilus* Wolfg., nat. size, drawn from the specimen in the Holmesdale Natural History Club Herbarium. B. Apex of leaf, enlarged. C. Portion of stem showing stipule, nat. size.

NEW MALAYAN PLANTS.

By H. N. Ridley, M.A., F.L.S.

Among the more interesting discoveries made recently in the Malay Peninsula, the following are the most noteworthy novelties. Perhaps the most striking is the addition of the genus *Tupistra* to the flora of the Malay region; the group of *Liliaceæ* to which it belongs—*viz.* the *Aspidistreæ*—is characteristic rather of the Himalayan and Chinese regions, and hitherto has not been recorded south of Tenasserim.

Didymocarpus cyaneus, sp. n. Acaulis, foliis pluribus ovatis crenatis pubescentibus, petiolis semiteretibus crassis, 4–5 pollices longis, 3 pollices latis. Scapi plures 2-flori erecti, 3 pollices longi. Bracteæ lanceolatæ angustæ. Flores magni speciosi, pedicellis pollicaribus. Calyx 5-fida, laciniis angustis linearibus, ½ pollicis longis, ad basin liberis. Corollæ tubus curvus superne dilatatus, lobis rotundatis latis, labio inferiore quam superius majore. Flos 1½ pollicis longus, ½ pollicis latus atro-cæruleus, fauce pallidiore. Stamina 2, filamentis in medio dilatatis albis, antheris parvis oblongis flavis. Stylus longus, stigmate apice canaliculato. Capsula teres subulata longe rostrata pubescens.

Siamese territory at Kasum. Collected by Mr. C. Curtis.

The number of *Didymocarpi* in the Siamese-Malayan region seems endless, every district supplying one or more new kinds; but few have been met with here more beautiful than this charming little plant. Its deep blue flowers are produced in abundance almost all the year round, and it is one of the easiest to cultivate; so that it ought to be a popular plant of cultivation. Its affinity is with *D. lacunosa* Hook. fil.

Didymocarpus corchorifolia Wall. The genus *Didymocarpus*, as defined in Clarke's Monograph (De Candolle, *Mon. Phan.* v.) and the *Flora of British India*, iv. 345, comprises a most heterogeneous collection of plants, which it would probably be more satisfactory to sort into several distinct genera; but to do this suitably it will be necessary to wait till the species are more thoroughly known. Among the most distinct, however, is the remarkable *D. corchorifolia* Wall., which is classed by Mr. Clarke in the section *Didymanthus*, but of which he says: "Habitu proprio cum characteribus sectionis male congruens, nulli specie forsan arcte affinis" (*l. c.* p. 85). Now the section *Didymanthus* includes such very diverse plants as the tall-stemmed branching *D. cordata* Wall. with short-tubed flowers, and the almost stemless *D. longipes* Clarke, with long tubular flowers. *D. corchorifolia* Wall. has somewhat the habit of *D. cordata*, but, when full grown, forms a woody shrub, much branched, and from four to six feet tall, with axillary panicles bearing numerous flowers with cup-shaped bracts at the bases of the peduncles and pedicels. Its most peculiar point, however, which has been quite overlooked in all published descriptions, is that the corolla is shaped exactly like that of an *Antirrhinum*, the upper lips being appressed to the lower with the lobes turned

upwards, while the broader lower lip has the lobes turned down. I know no other instance in the whole order of this form of corolla. In all other species the corolla, though usually irregular, has a longer or shorter tube, with the lobes erect or reflexed, but the mouth of the tube is circular and open. The cup-shaped bracts are also peculiar, but somewhat similar ones occur in *D. citrina* Ridl. Finally, when one compares its stout shrubby habit with that of such a plant as the stemless soft *D. incana* or the herbaceous creeping *D. reptans*, one cannot avoid thinking that the genus as at present arranged is rather too comprehensive.

The flowers of *D. corchorifolia* are white, usually apple-green in the throat, and sometimes tinted or stained with dull purple. It grows on banks or rocks on Penang Hill; on the hill Bujong Malacca; in Perak; and along the Pahang track from Selangor, at an altitude of about 2000 ft.

Enhydrias, gen. nov. *Hydrocharidearum*.

Herba submersa ramosa caulibus gracilibus. Folia alterna angusta linearia acuminata minute dentata. Flores solitarii axillares bisexuales, basibus in vagina longa tubulosa inclusis. Calycis tuba longa gracilis, lobi lanceolati acuti virides. Petala 3 linearia multilongiora anguste linearia obtusa alba. Stamina 3, in fauce tubi adnata brevia, antheris linearibus terminalibus. Styli 3 quam stamina breviores cylindrici. Capsula angusta cylindrica in vagina inclusa, ovula plura anatropa. Semina fusiformia papillosa.

E. angustipetala, sp. unica. Herba 6 ad 24 pollices longa. Folia linearia acuminata, $1\frac{1}{2}$ pollicis longa, $\frac{1}{16}$ pollicis lata, alterna, internodiis $\frac{1}{8}$–$\frac{1}{4}$ pollicis longis, olivacea vel rufescentia uninervia. Flores sessiles. Spathæ pollicem longæ complanatæ, apicibus bifidis. Perianthii tubus supra spatha, $1\frac{1}{2}$ pollicis longus, gracilis virescenti albus. Calycis lobi lanceolati, $\frac{1}{8}$ pollicis longi, virides. Corollæ lobi angusti lineares pustulati albi ultra $\frac{1}{4}$ pollicis longi. Stamina gracillima parva. Capsula pollicem longa, semina circiter 14 fusiformia, olivacea, pustulis in seriebus tribus longitudinalibus.

Common in fresh water, ponds and ditches. Singapore, everywhere; Malacca, at Merliman; Perak, Dindings; Pahang, near Pekan.

This plant might almost be described as a *Lagarosiphon* with the flowers of a *Blyxa*. It forms thick masses in ponds and ditches, and is quite a pest in the garden lakes, growing with great rapidity. The whole plant is submerged, except the upper part of the perianth-tube. The leaves are narrow, much like those of *Lagarosiphon Roxburghii* Benth., green or dull red, alternate and about a quarter of an inch apart, except near the flowers, where they are often crowded together. The flowers are unisexual, solitary in the axils of the leaves, with a long slender pinkish-white tube and narrow white petals, beautifully pustulated and shining under a lens. The flowers are apparently self-fertilized, as I have always found the anthers dehisced, and the stigmas covered with pollen in the bud. The seeds are shortly fusiform, with three longitudinal rows of processes. The plant flowers all the year round, and the ponds are often dotted all over with its small white flowers.

It is curious that so common a plant should have been long overlooked; but it is probable that herbarium specimens, if collected, may have been mistaken for *Lagarosiphon Roxburghii*, as these aquatic plants are rather troublesome to preserve well in this country.

Dendrobium Foxii, sp. n. Epiphytica, caulibus gracilibus tripedalibus rubris; folia tenuia lanceolata acuminata atroviridia nitentia, 4 pollices longa, pollicem lata. Flores in caulibus defoliatis, 7–10 in racemo, majusculis, pedicellis gracilibus pollicaribus pallide roseis. Sepala ovata acuta pallide roseo-alba, $\frac{5}{8}$ pollicis longa, $\frac{1}{4}$ pollicis lata, lateralia quam superius obtusiora curva. Mentum pollicare curvum, a basi cylindrico dilatatum apice acuminato curvo roseo. Petala oblongo-obovata rotundata marginibus fimbriatis quam sepala majora ferme $\frac{3}{4}$ pollicis longa, alba. Labellum basi angusto lineari, lamina abrupte dilatata pandurata biloba, lobis rotundatis fimbriatis album. Columna crassa lata, brachiis brevibus obtusis crassis aurantiacis.

Perak. Thaiping Hills, at about 4000 ft. elevation (*W. Fox*).

This pretty orchid belongs to the section *Pedilonum*, and is allied to *D. hymenanthum* Hook. fil.; but the flowers are rather larger; the lip has a broad blade, suddenly dilated, then pinched in and dilated again, and bilobed at the apex; the large and stout spur is curved and dilated towards its end, terminating in a distinct short point. It is very floriferous, and perhaps as showy as any of the section.

Cirrhopetalum maximum, sp. n. Rhizoma longum repens, pseudobulbis remotis anguste oblongis planis, 5 pollices longis, viridibus. Folium lanceolatum coriaceum atroviride, 12 pollices longum, 4 pollices latum. Scapus 12 pollices longus, erectus. Flores in verticillo terminali 7. Bracteæ pollicem longæ, lanceolatæ acuminatæ rubescentes. Pedicelli crassi æquilongi, ovarium canaliculatum. Sepala lanceolata caudata, 5 pollices longa, pallide viridia, venis obscurioribus caudis purpureis, omnia æqualia et libera. Petala 2 pollices longa, angusta caudata. Labellum linguiforme carnosum magnum apice acuto lacteo medio violaceo. Columna crassa lata oblonga, brachiis 2 erectis brevibus, 2 crassis latis porrectis violaceis. Anthera rotundata flava. Stigma profundum margine lobato. Rostellum rotundatum. Capsula oblonga.

Perak. On the hill Bujong Malacca, 1 to 2000 ft. altitude, creeping on rocks and trees.

This is truly a marvellous plant, and somewhat difficult to classify, as it might really be classed either with *Cirrhopetalum* or with the Bulbophyllums of the *Sarcochilus* section. The flowers are arranged in a whorl more than a foot in diameter, each one being with its pedicel more than 6 in. long. The long-tailed sepals are pale green, with darker veins, and long purple points; the lip and column cream-colour, with mauve markings. Though not brilliantly coloured, it is one of the most striking species of the genus from its great size and peculiar form. It is abundant on rocks and trees on the hill known as Bujong Malacca, a locality which has produced a number of other remarkable and beautiful plants.

Bulbophyllum hirtulum, sp. n. Planta perparva pseudobulbis congestis globosis, vix $\frac{1}{4}$ pollicis longis. Folium oblongum lanceolatum obtusum, $1\frac{1}{2}$ pollicis longum, $\frac{1}{2}$ pollicis latum. Scapus gracilis biflorus, 2 pollices longus. Flores $\frac{1}{4}$ pollicis longi, ovariis et pedicellis brevibus rubris. Sepalum posticum ovatum lanceolatum acutum, lateralia latiora falcata alba apicibus purpureis pubescentia. Petala angusta linearia alba venis et ciliis in marginibus brunneis. Labellum linguiforme hispidum atro-rufum. Columna brevis lata, brachiis brevissimis viridia basi rufa. Anthera aurantiaca.

Penang. On trees on the Western hill, in thick jungle, rare, at 3000 ft. elevation, flowering in March.

No greater contrast could there be between this very small plant and the preceding large species. The affinity of *B. hirtulum* is with *B. hymenanthum* Hook. fil., but it in many points recalls the much larger *B. lasianthum* Lindl., a native of the same locality.

Collabium nebulosum Bl. This charming foliage plant has been added recently to our flora by Mr. Derry, who found it on the Thaiping Hills, in Perak. It has hitherto only been recorded from Java.

Cymbidium Stephensi, sp. n. Epiphyta magna pseudobulbis oblanceolatis complanatis, 4–6 pollices longis, 2 pollices latis. Folia bina oblanceolata obtusa coriacea basibus in petiolis complanatis attenuatis, 8 pollices longa, 4 pollices lata. Racemi penduli multiflori, floribus majusculis dissitis. Bracteæ parvæ ovatæ pedicellis appressæ acutæ, $\frac{1}{8}$ pollicis longæ. Pedicelli recurvi crassi pollicem longi, ovarium æquilongum. Sepala oblongo-lanceolata acuta, ultra pollicem longa, ferme pollicem lata, lateralia subfalcata. Petala angustiora et breviora lanceolata acuta, $\frac{3}{8}$ pollicis lata. Labellum brevius trilobum lobis lateralibus latis oblongis obtusis. Epichilio parvo orbiculari basi angustato, pustulato, carina canaliculata in disco intra lobis lateralibus. Columna $\frac{3}{4}$ pollicis longa, crassa arcuata, alis parvis, margine clinandrii brevi rotundato. Rostellum breve profunde excavatum. Anthera breviter conica obtusa pustulata. Pollinia 2, ovoidea canaliculata, disco cordiformi.

Perak (*A. B. Stephens*).

This plant, when not in flower, has very much the habit of *Grammatophyllum scriptum*, with a large mass of stout pseudo-bulbs ending in a pair of broad coriaceous leaves. The racemes are pendent with rather large dull-coloured flowers, fleshy in texture, and hardly opening.

Its relationship is with *C. Traceyanum*.

Bromheadia scirpoidea, sp. n. Epiphytica, caulibus pluribus gracilibus complanatis, 6 pollices longis. Folia 4–5 angusta curva complanata pungentia coriacea, $4\frac{1}{2}$ pollices longa, $\frac{1}{16}$ pollicis lata. Inflorescentia subterminalis quam folium summum multo brevior, spicis pluribus $\frac{1}{3}$ pollicis longis congestis, bracteis parvis imbricatis ovatis. Flores singulatim expansi fugaces parvi, pedicellis $\frac{1}{4}$ pollicis longis, viridibus. Sepala lanceolata acuta $\frac{1}{3}$ pollicis longa, flavescentia cum linea mediana rosea. Petala latiora pallide flava. Labellum

trilobum, lobis lateralibus elevatis ovatis flavescentibus purpureo punctatis, lobo medio flavo, maculis duabus roseis ad basin, carina elevata oblonga in epichilio. Columna tenuis lata pallide viridis. Anthera parva, pollinia ovoidea, disco scutiformi magno tenui emarginato. Rostellum parvum rotundatum. Stelidia longa tenuia incurva.

Perak, near Ipoh; Pahang, Tahan Valley.

The Bromheadias vary more in form of the vegetative organs than in their flowers, the general design of which and even the colouring is similar all through the genus, and certainly no one would take this odd rush-like plant for one of the genus without seeing the flowers. The stiff narrow leaves, and stems, and tuft of little spikes with distichous bracts from which are produced flowers at long intervals of time, are quite peculiar in the genus. The flowers resemble in form those of other Bromheadias, but are very much smaller than in most species, pale whitish yellow, more or less tinted with pink. They only last a few hours.

Saccolabium undulatum, sp. n. Epiphyta, caulibus 6-pollicaribus complanatis viridibus. Folia lorata margine undulato, apice inæqualiter bilobo, flaccida obscure viridia, 5 pollices longa, $\frac{3}{4}$ pollicis lata. Racemi graciles penduli, 4 pollices longi, floribus copiosis minimis. Bracteæ minutæ ovatæ acuminatæ dimidio pedicelli cum ovario æquales. Sepala oblonga ovata flavescentia, fasciis duabus rubris $\frac{1}{16}$ pollicis longis. Petala linearia lorata angustiora obtusa flava cum maculis 4 rubris. Labellum lobis lateralibus vix distinctis, medio brevi angusto cornuto decurvo, calcare pedicello æquali obtuso in medio dilatato, callis nullis, flavum, maculis rubris duabus in fauce calcaris. Columna brevis crassa cum basi roseo. Anthera calvariiformis elevata. Pollinia 2, subglobosa, translucentia; pedicello superne dilatato triangulari, basi angusto lineari, disco oblongo, Capsula oblonga pyriformis.

Perak. Telok Pinang, near Ipoh, on trees, Oct. 1898.

A small and rather insignificant plant, with flat undulate leaves all twisted into one plane, dull green, with hanging racemes of very small yellow and red flowers. It belongs to the section *Micrantha*.

Sarcanthus rostellatus, sp. n. Caules ad 6 pollices longi, $\frac{3}{16}$ pollicis lati, foliis flaccidis loratis apicibus bilobis, lobis rotundatis, 7 pollices longis, $\frac{3}{4}$ pollicis latis. Panicula 6-pollicaris, pauci-ramosa, pedunculo viridi purpureo-maculato. Flores circiter 20, pedicellis $\frac{1}{4}$ pollicis longis. Bracteæ minimæ ovatæ pedicellis appressæ. Sepala oblongo-ovata obtusa, lateralia majora atrorubentia, linea mediana et apice viridi. Petala linearia. Labellum album, lobis lateralibus, brevibus obtusis porrectis, lobis medio reniformi-hastato carina mediana elevata, calcare curvo cornuto obtuso, $\frac{1}{8}$ pollicis longo, carina superna in calcare longo pubescenti, inferiore longo et pubescenti approximato. Columna brevis et crassa rufa, apice virescente. Stelidia brevia erecta rosea. Anthera pileata flava. Pollinia parva oblongo flava, canaliculata, disco superne lato, inferne angustato, apice bilobo, lobis latis divaricatis. Rostellum elongatum longe bifidum, lobis truncatis oblongis. Stigma profundum.

Perak, at Tambun, near Ipoh, flowering in April.

This species is chiefly remarkable for the shape of the disc of the pollen-masses, which resembles in form the merrythought of a fowl, having two long curved processes at the extremity. The rostellum is also remarkably long and deeply bifid, the processes being unusually large. The keels in the entrance of the spur are very long and hairy, and nearly meet so as to divide the spur almost in two.

Sarcochilus biserratus, sp. n. Epiphytica, caulibus pluribus congestis, 3–4 pollices longis. Folia anguste lineari-lanceolata, acuta carnosa, 4 pollices longa, $\frac{1}{4}$ pollicis lata. Racemi copiosi, complanati, 6 pollices longi vel ultra, $\frac{1}{8}$ pollicis lata. Flores distichi e foveis exorti, bracteis parvis ovatis, pedicellis cum ovariis virescenti-albis, $\frac{1}{4}$ pollicis longis. Sepalum posticum lanceolatum acutum ad basin angustatum, lateralia obliqua, $\frac{1}{4}$ pollicis longa. Petala sepalis similia angustiora omnia flavescentia. Labellum cum pede longo gracili, lobis lateralibus linearibus acutis excurvis, lobo medio minimo. Calcare longo conico cornuto horizontali, $\frac{1}{4}$ pollicis longo, omnino album ore calcaris violaceo. Columna alba brevis, anthera ovata rostrata, flava.

Perak, near Ipoh.

A small-flowered plant with tufted stems forming a compact mass and numerous flattened green rachises, excavate along each edge and bearing numerous small sweet-scented flowers, produced singly on the inflorescences and short-lived, the sepals and petals pale yellowish white, the lip pure white, except for a violet edge to the mouth of the spur.

Tupistra grandis, sp. n. Herba habitu *Susi anthelmintici*, caule brevi erecto radicibus aeriis brevibus albis extrusis. Folia lanceolata acuminata erecta atro-viridia, 24 pollices longa, 6 pollices lata. Spica erecta valida pedalis, rachide crasso carnoso, floribus 50 vel pluribus sessilibus, pollicem longus et $\frac{3}{4}$ pollicis latis, alabastris tetraquetris oblongis truncatis ferme atris. Bracteæ ovatæ purpureæ minimæ. Perianthium campanulatum, purpurascens pollicem longum apicibus sepalorum et petalarum recurvis atro-purpureis ovatis. Antheræ 6 in fauce tubo sessiles alba oblonga. Stylus crassus alba, perianthiio superans, stigma maximum rotundatum medio depresso album. Ovarium trilocularis, ovula in loculo utroque 2.

Perak, in dense forest on the hill Bujong Malacca.

This plant is a most interesting one, not only on account of its locality, being the most southern species of the group of *Aspidistreæ*, but also on account of its being probably the finest species of its genus. Its general appearance is that of *Susum anthelminticum* Bl., a common plant in the peninsula, for which indeed I mistook it till I found a flowering specimen close to the camping ground. The flower-spike is rather shorter than the leaves, erect and fleshy, with numerous flowers opening two or three at a time. They have the appearance of nearly black basins with recurved edges, from the centre of which arise small white fungi, on stout stalks (the pistils). The buds and tips of the petals and sepals are deep purple,

almost black, and the contrast with the ivory-white pistil is most striking.

The group *Aspidistreæ* includes the genera *Aspidistra*, *Gonioscypha*, *Rohdea*, and *Tupistra*, all natives of the Himalayas, Burma, China, and Japan, one species of *Tupistra* being found as far south as Moulmein—viz. *T. Stoliczkana* Kurz, which appears from the short description in the *Flora of British India* (vi. 325) to be the most nearly allied species. A plant described by Mr. Baker in *Journ. Linn. Soc.* xiv. 581, as *Tupistra singapurana*, collected in Singapore by Wallich (no. 5195), is a fruiting specimen of *Neuwiedia Curtisii* Rolfe. Live plants of *T. grandis* are in cultivation in the Botanic Gardens, Singapore, where one has already flowered; and one was also sent to Kew Gardens.

Andropogon hirtiflorus Kunth. Sandy seashores near Changi and Galang, Singapore; also Blakangheati Island.

Polytrias præmorsa Hack. Turf in Botanic Gardens, Changi, and other open spots in Singapore; Malacca, near the town.

These two grasses are not recorded for the peninsula in the *Flora of British India*, and the latter appears only to have been collected in Java hitherto.

NOTES ADDITIONAL TO THE 'FLORA OF CHESHIRE.'

By Spencer Moore, F.L.S.

The following notes, relating to Cheshire records, were found by Lady Leighton among Lord de Tabley's papers, but too late for incorporation in the *Flora of Cheshire*:—

Cochlearia officinalis L. and *C. anglica* L. "*C. officinalis*. Cultivated, June, 1822. Root from Hale Marsh, near Warrington, 1821. The globose veinless capsule and the cochleariform leaves would induce me to keep this distinct from *C. anglica*. Riverside below Warrington, Aug. 1824. *C. anglica* is more common about Warrington than *C. officinalis*." W. Wilson (with specimens) in Herb. Kew.

Rubus humifusus Weihe. In the British Herbarium of the Linnean Society are specimens (from the herbarium of Bell-Salter) of the Beeston Castle *Rubus* labelled: "ex Herb. Borrer. *Rubus Koehleri* (var.): *R. apiculatus* W. & N. Beeston Castle, 18.7.1844." These bear Babington's MS. name, under date 1860, *R. Koehleri* γ *pallidus*. They are the same as the Kew specimens which Professor Babington has there called *R. humifusus*, but which Mr. Baker referred to *R. pallidus* without the least hesitation.

Rosa canina L. var. *decipiens* Dumort. Mr. Wilson's Cheshire specimens in Herb. Borrer are from Over, gathered in 1830.

Asarum europæum L. "In the wood near Rev. Stolterfoth's, Rainow, Cheshire." Memorandum of J. D. Siddal, of Chester, in whose possession I saw a specimen of the plant in July, 1875. *F. M. Webb.*

Malaxis paludosa Sm. "Sink Moss, Cheshire, Aug. 1826." W. Wilson in *Hooker's Journal of Botany*, i. 306. Specimens were collected in the same place by Mr. Borrer in 1837, probably under the direction of Mr. Wilson. I do not know where Sink Moss is.

Festuca pratensis Huds. var. *loliacea*. "Some years ago I visited a meadow on the banks of the Weaver above Northwich, where *Festuca pratensis* and *F. loliacea* were growing together in profusion." W. Wilson in *Phytologist*, ii. 446.

Cladium Mariscus Br. "Lake near Rosthern Mere, Cheshire, Mr. Campbell." Deakin, *Florigraphia Britannica*, i. 32 (1857). This is an earlier record by three years that in Wood's *Flora Mancuniensis*. Very likely Mr. Wilson had given specimens to the Edinburgh Botanical Society, some of which were distributed by Mr. Campbell, and I believe that it was Rostherne that was the locality meant by Mr. Wilson in his communication of *Cladium* as a Cheshire plant to Smith (vide *English Flora*) and Hooker (vide *British Flora*).

The following Cheshire specimens are in the British Herbarium of the Linnean Society :—

Lepidium Draba L. Chester, 1847. Miss Potts.

Diplotaxis tenuifolia DC. On Chester walls, May 25th, 1828. Herb. N. Winch.

Sedum reflexum L. Sandy hedge-banks between Knutsford and Monksheath. H. C. Watson in Herb. N. Winch.

Saxifraga Hirculus L. Knutsford Moor. Mr. Holland, Herb. N. Winch.

Bupleurum tenuissimum L. Near Chester. Miss Potts.

Chærophyllum Anthriscus Lam. Chester walls, May 25th, 1828. N. Winch.

Juncus nigritellus D. Don. New Brighton, Sept. 18th, 1837. C. C. Babington.

Lycopodium inundatum L. Sale's Moor, near Manchester. Mr. E. Robson, Herb. N. Winch.

Cheshire *Carices* in Herb. Boott at Kew :—

Carex paniculata L. Mr. Wilson, 1836.

C. axillaris Good. Mr. Wilson, 1836.

C. elongata L. Dr. Hooker, 1834. No doubt derived from Mr. Wilson.

C. stricta Good. Mr. Wilson, 1841.

Cheshire specimens in Herb. Borrer at Kew :—

Epipactis palustris Cr. Knutsford Moor, 1837.

Calamagrostis stricta Nutt. Oakmere, Sept. 1846.

Carex filiformis L. Oakmere, 1846. G. E. Smith.

Mr. Borrer probably went to the meeting of the British Association at Liverpool in 1837. He was with Mr. Wilson during his visit to the county. He went, during this trip, to Chester, New Brighton, Knutsford, and Beeston.

The following records will be found in *Phytologist* iv. 696 (1852):—

Nephrodium spinulosum Desv. Whitchurch. — *N. Thelypteris* Desv. Quirsley Mere, near Whitchurch and Wybunbury Moss.— *Osmunda regalis* L. Whitchurch neighbourhood. R. W. Rawson is the authority for all three.

I take the present opportunity of adding the notes which follow:—

Saxifraga Hirculus L. Probably the earliest reference to this as a Cheshire plant is to be found in the *Correspondence of Dr. Richardson*, p. 167. Here, in a postscript to a letter from Dr. Sherard, under date March 28th, 1721, we read: "I had a letter lately from Dr. Fowlkes. . . . . He says *Saxifraga angustifolia fl. luteis punctatis, Breyn. Cent.* was found near Knutsbridge Mills in Cheshire." Mr. Britten showed me Richardson's specimen in Herb. Sloane (cxlvi, fol. 9), as also another gathered in the succeeding year (ccxiii, fol. 1). — *Acorus Calamus* L. Dr. Richardson's specimen from Holford (*vide* Fl. of Cheshire, p. 280) is also in Herb. Sloane (cxlvi, fol. 9).

I must express my regret for allowing to let pass the statement on p. lxxxi of the *Flora* that "no satisfactory account of Gerard's life has yet been compiled." This was done in forgetfulness of Mr. B. D. Jackson's interesting biographical sketch prefixed to his reproduction of Gerard's *Catalogue* (London, 1876). The sentence quoted above was of course penned by Mr. Warren before Mr. Jackson's work appeared.

NOTE ON COSMIA.

By James Britten, F.L.S.

In the course of naming the Banksian engravings of Australian plants shortly to be published by the Trustees of the British Museum, it became necessary to look up the history of the genus *Calandrinia*, one species of which—*C. quadrivalvis* F. Muell.—is among the plants represented.

It requires little research to discover that *Calandrinia* (H. B. K. Nov. Gen. vi. 78 (1823)) is antedated by *Baitaria* (Ruiz & Pav. Prodr. 63, t. 36 (1794)), of which Bentham & Hooker say (Gen. Pl. i. 158), "a *Calandrinia* haud diversa videtur." All possibility of doubt as to the identity of the two is removed by the inspection of Ruiz and Pavon's specimens, two sheets of which, from Pavon's herbarium, are in the National Herbarium. The same specific name was adopted for the plant under both genera, although the identity of *Baitaria* with *Calandrinia* does not seem to have occurred to the founders of the latter genus.

There is, however, a still earlier name to be considered. In establishing the genus *Calandrinia*, the authors (Nov. Gen. vi. 77

(1823)) quote as a synonym "*Cosmia* Domb. Juss." The reference is to Juss. Gen. 312 (1789), where, at the end of the description of "*Talinum* Adans.," is the sentence: "An congener *Cosmia* Domb. Peruv. distincta caule herbaceo, floribus solitariis axillaribus 5-andris, habitu *Samoli*?" Although no full description of Dombey's genus appears to have been published, there seems to be no doubt as to its identity with *Calandrinia*; Sprengel (Syst. ii. 453 (1825)), who, by the way, cites *Calandrinia* as of Kunth only, follows H. B. K. in quoting *Cosmia* (*caulescens*) as a synonym of *Calandrinia caulescens*, and De Candolle cites MS. names of two other species referred to *Cosmia* by Dombey in his herbarium, but placed in the *Prodromus* (iii. 359 (1828)) under *Calandrinia*. Even supposing the citation from Jussieu were not accepted as sufficient definition of the genus, the name would be at least of equal date with *Calandrinia*, under which, as already mentioned, it is quoted as a synonym by the founders of the genus.

Dr. Kuntze follows Ferdinand von Mueller in placing both *Talinum* and *Calandrinia* (to which he adds *Baitaria*—or, as he prefers to spell it, *Baitura*) under *Claytonia*, but Dr. Pax (Engler & Prantl, Pflanzenfam. iii. 16, 55) keeps them distinct, as do other authors.

The nomenclature of the plants already placed under *Cosmia* is as follows:—

Cosmia caulescens Domb. ex Spreng. Syst. ii. 453 (1825), et in Herb. Mus. Brit. !, where there is a specimen from Dombey's herbarium, with a transcription by L'Héritier of Dombey's MS. description.
Calandrinia caulescens H. B. K. Nov. Gen. vi. 78, t. 526 (1823).
Cosmia montana Domb. ex DC. Prodr. iii. 359 (1828).
Claytonia caulescens O. Kuntze, Rev. Gen. i. 57 (1891).

Cosmia prostrata Domb. ex DC. Prodr. iii. 359 (1828).
Baitaria acaulis Ruiz & Pav. Syst. Veg. 111 (1798); Fl. Per. Ic. t. 403 a (1802); et in Herb. Mus. Brit. !
Calandrinia acaulis H. B. K. Nov. Gen. vi. 78 (1823); DC. *l. c.*
Claytonia acaulis O. Kuntze, Rev. Gen. i. 57 (1891).

Those who insist on the retention of the oldest specific name will call the plant *Cosmia acaulis*.

I do not propose to follow the practice of some botanists in publishing names for the other species of *Calandrinia* under the genus to which they will have to be transferred, as I consider such practice unscientific and likely needlessly to increase synonymy; but it will be convenient for purposes of citation to name here the Australian plant which led to this inquiry. This is—

Cosmia quadrivalvis.
Calandrinia quadrivalvis F. Muell. Fragm. i. 76 (1859).
Claytonia quadrivalvis F. Muell. Census Austral. Pl. 27 (1882).

DENBIGHSHIRE MOSSES.

By Eleonora Armitage.

In June, 1898, I spent three or four days collecting mosses in a hilly district of Denbighshire (v.-c. 50), about seven miles west of Oswestry. The geological formation there is Lower Silurian, consisting of slate rocks and soft black shales (Llandeilo). The elevation of the district above sea-level is as follows :—Tydraw Valley, 831 ft.; hill above Tydraw, 1467 ft.; hill above Rhiwlas, 1490 ft.; Gyrn Moelfre, 1715 ft.

I collected fifty species and varieties, thirty-one of which are given here, nineteen being omitted as they have already been recorded for Denbighshire in the list published by Mr. H. N. Dixon in this Journal for 1898, p. 186. The Rev. C. H. Binstead and Mr. E. C. Horrell have kindly helped me in determining the species.

I have now received a valuable additional list for Denbighshire from Professor Barker, who has courteously placed it at my disposal. I have therefore incorporated it here. Professor Barker's collection was made during the last week of August and the first week of September, 1899, in two parts of the county—*viz.* the neighbourhood of Capel Garmon, and around Colwyn Bay, including Bryn Euryn, a limestone hill of the Orme's Head group.

Professor Barker's list contains one hundred and seventy-seven species and varieties ; of these, forty-seven have been recorded in Mr. Dixon's list and my own, the remaining one hundred and six are new. Some of the doubtful specimens were referred to Mr. Dixon. Mosses collected both by Professor Barker and myself are distinguished by the initials (*T. B.*, *E. A.*) following the name; those collected only by myself are marked (*E. A.*); the rest, by Professor Barker, are unmarked. With the sixty-four mosses of Mr. Dixon's list, the total for Denbighshire now includes two hundred and one species and varieties.

Sphagnum papillosum Ldb.—*β confertum* Lindb.— *S. squarrosum* Pers. *E. A.* — *S. acutifolium* × *arctum* Braithw. — *S. intermedium* Hoffm. *T. B., E. A.*

Andreæa Rothii ♂ *falcata* Lindb.

Tetraphis pellucida Hedw.

Catharinea undulata W. & M. *T. B., E. A.*

Polytrichum aloides Hedw. *T. B., E. A.* — *P. urnigerum* L.— *P. juniperum* Willd. *T. B., E. A.*—*P. strictum* Banks.

Pleuridium axillare Lindb.

Ditrichum flexicaule Hampe.

Ceratodon purpureus Brid. *T. B., E. A.*

Cynodontium Bruntoni B. & S.

Dichodontium flavescens Lindb.

Dicranella heteromalla Schimp. *T. B., E. A.*—*D. varia* Schimp. *D. Schreberi* Schimp.—*D. squarrosa* Schimp. *E. A.*

Campylopus atrovirens De Not.

Dicranum scoparium Hedw. *T. B., E. A.*—*γ orthophyllum* Brid. —*δ spadiceum* Boul. *E. A.*—*D. majus* Turn.

Fissidens bryoides Hedw. *T. B., E. A.*—*F. osmundioides* Hedw. —*F. adiantoides* Hedw.—*F. taxifolius* Hedw.

Grimmia apocarpa Hedw.—*G. orbicularis* Bruch.—*G. trichophylla* Grev. — *G. Stirtoni* Schimp (forma *propagulifera*). — *G. arenaria* Hampe (see note at end of paper).

Rhacomitrium protensum Braun. — *R. heterostichum β alopecurum* Hüb.—Var. *obtusum* (= *Grimmia obtusa* Lindb.).

Hedwigia ciliata Ehrh.

Pottia truncatula Lindb.

Tortula ambigua Angstr.—*T. aloides* De Not.— *T. muralis* Hedw. *T. B., E. A.* —*β rupestris* Wils. — *T. subulata* Hedw. — *T. lævipila* Schwaegr.—*T. intermedia* Berk.—*T. ruralis* Ehrh.—*T. ruraliformis* Dixon.

Barbula rubella Mitt. — *B. tophacea* Mitt. var. *acutifolia* Schimp. —*B. fallax* Hedw.—*β brevifolia* Schultz.—*B. recurvifolia* Schimp.— *B. rigidula* Mitt. — *B. cylindrica* Schimp. — *B. vinealis* Brid. —*B. sinuosa* Braithw.—*B. gracilis* Schwaegr.—*B. Hornschuchiana* Schultz.— *B. revoluta* Brid.— *B. convoluta* Hedw.— *B. unguiculata* Hedw.

Weisia tortilis C. M. — *W. viridula* Hedw. *E. A.* — *W. crispata* C. M. (see Journ. Bot. 1899, 375).—*W. calcarea* C. M.

Trichostomum crispulum Bruch.—*T. mutabile* Bruch.—*β littorale* Dixon.—*T. flavovirens* Bruch.—*T. nitidum* Schimp.

Encalypta vulgaris Hedw.

Zygodon viridissimus R. Br.—*β rupestris* Lindb.

Ulota Bruchii Hornsch. — *U. crispa β intermedia* Dixon. — *U. phyllantha* Brid.

Orthotrichum cupulatum Hoffm. — *O. leiocarpum* B. & S. — *O. Lyellii* H. & T. *T. B., E. A.* — *O. affine* Schrad. — *O. straminеum* Hornsch.—*O. diaphanum* Schrad.

Splachnum ampullaceum L. *T. B.*, 1886; not seen, 1899.

Funaria Templetoni Sm. — *F. calcarea* Wahl.— *F. hygrometrica* Sibth. *T. B., E. A.*

Webera nutans Hedw. *T. B., E. A.*—*γ bicolor* Schimp. *E. A.* —*W. carnea* Schimp.—*W. albicans* Schimp.

Bryum pendulum Schimp. — *B. inclinatum* Bland. — *B. pallens* Sw. *E. A.* — *B. intermedium* Brid. *E. A.* — *B. cæspiticium* L.— *B. erythrocarpum* Schwaegr.—*B. murale* Wils.—*B. alpinum* Huds. —*B. argenteum* L. *E. A.*

Neckera crispa β falcata Boul.—*N. pumila β Philippeana* Milde.

Pterogonium gracile Sw.

Heterocladium heteropterum B. & S.

Thuidium delicatulum Mitt.

Pleuropus sericeus Dixon. *T. B., E. A.*

Camptothecium lutescens B. & S.

Brachythecium albicans B. & S.—*B. plumosum* B. & S.—*B. velutinum* B. & S. *T. B., E. A.*—*B. purum* Dixon. *T. B., E. A.*

Eurhynchium prælongum B. & S.—*β Stokesii* Lond. Cat. Mosses, ed. 2.— *E. Swartzii* Hobk. *T. B., E. A.*— *E. pumilum* Schimp.— *E. myosuroides* Schimp.—*E. striatum* B. & S.

Amblystegium serpens B. & S. *T. B., E. A.*—*A. filicinum* De Not.

Hypnum polygamum Schimp.—*H. stellatum* β *protensum* B. & S. —*H. chrysophyllum* Brid.—*H. fluitans* L. *E. A.*—*H. exannulatum* Gümb.—*H. cupressiforme* L. *T. B., E. A.*—β *resupinatum* Schimp. —γ *filiforme* Brid. — η *tectorum* Brid. — *H. Patientiæ* Lindb. — *H. molluscum* Hedw.—*H. stramineum* Dicks.—*H. cuspidatum* L. *T. B., E. A.*—β *pungens* Schimp.—*H. Schreberi* Willd. *T. B., E. A.*

Hylocomium squarrosum B. & S. *T. B., E. A.*—*H. triquetrum* B. & S. *T. B., E. A.*

Note.—It is interesting to record here, what has not been previously published, that Professor Barker first discovered *Grimmia arenaria* Hampe as a British plant near Dolgelly, Merionethshire, in August, 1898; while this year he has added a second station for it near Capel Garmon, Denbighshire.

"JUNCUS TENAX."

By A. B. Rendle, D.Sc., F.L.S.

Mr. Britten having drawn my attention to a certain confusion of species under the name *Juncus tenax* Soland., we went into the matter with some care, and with the aid of the literature, including the invaluable manuscripts of Banks and Solander, arrived at conclusions which may be worth recording.

1. Juncus tenax Sol.—In the Appendix to Forster's *Florulæ Insularum Australium Prodromus* (1786) under "Plantæ Obscuræ" we find "514. *Juncus tenax* S. Nova Zeelandia." The S. signifies Solander, as is shown by a footnote explanatory of the heading, which reads, "Hoc titulo colliguntur plantæ in Australiæ insulis a nobis quidem lectæ, sed vel imperfecte, vel omnino, deficientibus floribus et fructificationibus, non descriptæ. Nomina nonnullis deinde adjecta juxta sententiam b. Solandri qui easdem olim descripserat." This note evidently refers to the Solander manuscript —that is, to the descriptions by Banks and Solander of the plants collected by them on Cook's earlier voyage; and the "*J. tenax* S." means that Solander referred Forster's plant to the species previously collected and thus designated by themselves.

The identity of this New Zealand plant has hitherto been doubtful. E. H. F. Meyer, in his *Synopsis Juncorum* (p. 59) (1822), puts it among the species dubiæ. Wikstrom, in K. Vetensk. Acad. Handl. 1823, 275, cites it as synonymous with *J. glaucus* Ehrh., "sec. assertionem Cel:mi Dryander olim in litteris ad Dom. Montin." Schultes also (System. Veget. vii. 182 [1829]) inserts it, with a query, under *J. glaucus*, on the same authority, and Allan Cunningham (in Hook. Comp. Bot. Mag. ii. 374 [1837]) says, "What *Juncus tenax* Sol. MSS. (enumerated by Forster in his Prodr. n. 514, without a description) may be, of which specimens were collected in New Zealand, in the first voyage of Capt. Cook, appears doubtful. Schultes observes," &c.

Fortunately the possession of the manuscript and specimens of Banks and Solander enables us to settle the matter. Banks and Solander collected in New Zealand two plants which they considered as varieties of one species, naming them respectively *J. tenax α major* and *J. tenax β minor*. *J. tenax α major* was collected near Totaranui. It is *J. pallidus* R. Br. Prodr. 258. Hooker in Fl. Nov. Zel. pt. i. 263 makes it a synonym of *J. vaginatus* R. Br. which, however, Buchenau regards as "an abnormal form of *J. pallidus* R. Br." (Engl. Jahrb. xii. 238).

Juncus tenax var. *β minor* Banks et Sol. was collected near Tolaga, Opuragi. It is *J. pauciflorus* R. Br. Prodr. 259, and also the "*Juncus effusus* L." of Hooker's Flor. Nov. Zel. *l. c.*

The citation in the *Flora Novæ-Zelandiæ* reads "*J. tenax β minor* Banks et Sol. MSS. et Ic.," and there is the same reference to a figure under var. *major*. This must be a slip, as there is no figure of either plant, nor do the authors refer to one in their manuscript.

Specimens of Forster's *Juncus tenax* exist both at the British Museum (in Herb. Banks) and Kew. They are referable to *J. australis* Hook. f. (Fl. Tasm. 66), as pointed out by Buchenau (*l. c.* 240). Buchenau is in doubt as to whether the forms with flowers crowded in small groups form a distinct species (*J. australis*), or belong partly to *J. effusus*, partly to *J. pauciflorus*, "observations in the field can only decide." They approach very near the *J. vaginatus* R. Br. with which I am inclined to include them. Forster's specimen in Herb. Banks was subsequently named *J. glaucus* by Dryander, a fact which accounts for the above-mentioned statement on Wikstrom's authority.

2. JUNCUS TENAX Banks & Sol. in Russell, Nat. Hist. Aleppo (ed. 2), ii. 251 (1794).

In the second edition of Alexander Russell's *Natural History of Aleppo*, l. c., we find among the plants a new species, "Juncus tenax; culmo nudo stricto striato, panicula laterali rara, squamis radicalibus nitidis."

This second edition, "revised, enlarged and illustrated with notes," we owe to his brother Patrick Russell, who in his preface and notes gives the full story of the plants. "The catalogue of plants," he says, p. viii, "will be found to have undergone material alteration, and to be much improved. But it is my duty to acknowledge that this is to be ascribed to the friendly assistance of Sir Joseph Banks (and the late Dr. Solander), who, with their usual readiness to countenance every attempt tending to the advancement of natural history, bestowed many hours on the examination of a large collection of specimens from Syria; and, after correcting numberless errors in the former arrangement, composed the classical catalogue now substituted for the old one." On page 238 he states that "to the original specimens belonging to my brother were joined a considerable collection of my own, which I brought from Syria." Mr. Britten points out that the above-mentioned association of Banks with Solander in the actual working-out of the specimens is quite in a line with other evidence which goes to prove that "Banks & Sol.," and not merely "Sol.," must be cited as authority for these and other species.

It is of interest to note that in the Solander manuscripts, where the diagnosis is exactly as printed in Russell's work, Dryander subsequently erased the specific name *tenax*, substituting that of *glaucus*. Kunth, Enum. iii. 599 (1841), cites it as "species dubiæ affinitatis." Buchenau, *l. c.*, p. 243, makes it a synonym of *J. glaucus* Ehrh,, and adds a note (nota 4, p. 246): "from the locality and description *J. tenax* can only refer to our *J. glaucus*." An examination of the plant, which we have at the Museum from Patrick Russell, shows it to be a form of *Juncus acutus* L., with laxly effuse panicle and small roundly obovate fruit (2·5 mm. long), perhaps referable to var. *Tommasinii* Buch. *l. c.* 250.

3. JUNCUS TENAX Poir. Encycl. Méth. Suppl. iii. 156 (1813). "Jonc des jardiniers."

Buchenau, in his Krit. Verz. Junc. 45 (1880), says probably *J. glaucus* Ehrh., but in his monograph (in Engl. Jahrb. xii. [1890]) makes no reference to it. That it is *J. glaucus* seems evident from Poiret's description and notes, and his citation of *Juncus acutus vulgaris* Moris. Hist. 3, § 8, tab. 10, fig. 13. This is the *Juncus acutus, vulgaris* Parkinson, the Hard Rush of Ray's *Historia*, which specimens in Sloane's Herbarium show to be *Juncus glaucus*.

4. JUNCUS TENAX Brown in Leop. v. Buch, Physic. Beschreib. Canar. Ins. 191 (1825), nomen.

A sheet in the Banks Herbarium bears plants collected in Madeira both by Banks and Solander and by Masson, and is inscribed in Solander's hand *Juncus tenax*, the *tenax* being subsequently erased and *glaucus* written beneath by Dryander. They are obviously *J. glaucus* Sibth. The sheet also bears specimens collected near London, and a manuscript note of Dryander, "tenax MSS." in our copy of Smith's *English Botany*, p. 665, also associates *tenax* with *J. glaucus*. Buchenau, who cites the species merely as a nomen nudum, "*J. tenax* Buch," suggests (Krit. Verz. 45) that it may be *J. canariensis* Willd., i. e. *J. effusus* var. *canariensis* Buch.

In brief, then, the species stand thus:—

1. J. TENAX Sol. in Forst. Prodr. 90 (1786) = *J. australis* Hook. f. Fl. Tasm. 66 (1860), which is probably a synonym of *J. vaginatus* R. Br. Prodr. 258 (1810) (= *J. pallidus* R. Br. *l. c. fide* Buchenau).
   - *J. tenax* α *major* Banks & Sol. ex Hook. f. Fl. Nov. Zel. i. 263 (1853) = *J. pallidus* R. Br. Prodr. 258 (1810).
   - *J. tenax* α *minor* Banks & Sol. ex Hook. f. *l. c.* = *J. pauciflorus* R. Br. Prodr. 259 (1810).
2. J. TENAX Banks & Sol. in Russell's Nat. Hist. Aleppo, ed. 2, ii. 251 (1794) = *J. acutus* L. var. *Tommasinii* Buchen. in Engl. Jahrb. xii. 250 (1890).
3. J. TENAX Poir. Encycl. Méth. Suppl. iii. 156 (1813) = *J. glaucus* Sibth. Fl. Oxon. 113 (1794).
4. J. TENAX Brown ex Buch, Physic. Beschreib. Canar. Ins. 191 (1825) = *J. glaucus* Sibth. *l. c.*

MYCETOZOA OF THE SOUTH MIDLANDS.

By James Saunders, A.L.S.

The lists appended to the present communication are supplementary to the one which appeared in this Journal in January, 1893 (pp. 10–13), and are indices of observations made during the ensuing seven years; the plants have been observed by Mr. C. Crouch, of Cainhoe, Beds, my son Edgar, and myself. In addition we have had the advantage of three or four visits to this district of Mr. A. Lister and Miss G. Lister, the latter of whom, while in our company, discovered *Diachæa subsessilia* at Flitwick, Beds, a first record for Europe.

The area embraced by these investigations may be roughly described as being within a ten mile radius of Luton. The extremes are Flitwick, Beds, to the northward; Wheathampstead, Herts, southward; Ivinghoe, Bucks, to the west; and Hitchin, Herts, to the east. In the area mentioned upwards of 90 species are recorded, and when it is mentioned that in Mr. Lister's monograph only about 110 species are enumerated as British, it will be readily conceded either that this district is peculiarly rich in these organisms, or that it has been well worked. Mr. Lister has also recorded 70 species for the Epping Forest district, and 80 for the neighbourhood of Lyme Regis.

Until the spring of 1897 it was customary to confine our researches to rotten wood and heaps of dead leaves; our happiest hunting grounds were woods and coppices, to which it was not always easy to gain access. In April of that year a casual investigation of a straw-heap that had lain undisturbed from the previous autumn yielded an abundance of an unusual form, and since that period such situations have been carefully examined, with most gratifying results. These straw-heaps possess the advantage of enabling one to search in full daylight, which is so different from the obscurity of woodland, and they also are usually in such situations that one has no difficulty in respect to trespassing.

Up to the present they have yielded the following noteworthy species and varieties:—

Physarum straminipes Lister (see Journ. Bot. 1898, 163, t. 386, fig. 3).
P. didermoides Rost.
P. didermoides var. *lividum* Lister (*l. c.* 161, t. 386, fig. 1).
P. vernum Somm. First British record.
Badhamia ovispora Racib. First British record.
Didymium Trochus Lister (*l. c.* 164, t. 386, fig. 1).
Fuligo ellipsospora Lister. Sept. 1899. First record for Europe.

All of the foregoing, except *Physarum vernum* Somm., have up to the present been found only in such situations. It should, however, be stated that the term "straw-heaps" includes the haulms not only of cereals, but also of peas, beans, and the other crops which form the staple of English agriculture.

With regard to *Didymium Trochus*, it is noteworthy that it has been found in increasing numbers each season since its original discovery in April, 1897. It was at first regarded as an abnormal form of *Didymium difforme* Duby. Further observations, however, showed that it was really different from this species, both to the naked eye and also beneath the microscope. Upon mature consideration it seems safe to assume that this species existed previously to 1897 in just such situations as those in which it is now seen, but, as these habitats had not been carefully searched, it had been overlooked. The plant is very retiring in its habit. Of the many thousands of sporangia which have come under my notice, none have been seen on the surface of the straw-heaps. When forming their sporangia they always do so at or below the line of saturation, and usually where the decaying material is matted together. This may be from two or three to six or eight inches below the surface, and their tawny hue is often of nearly the same shade as the decaying material in which they lie. When searching for them, it is found to be an advantage to lift up a thick layer of material, turn it upside down, when the sporangia, if present, rapidly dry, and thus become fairly conspicuous. They are, however, very disappointing when attempting to collect them, as their attachment to the straw is very slight, and numbers of them fall off in transit. In this respect they are widely different from those of *D. difforme*, with which *D. Trochus* is often associated.

So general is the habit with *D. Trochus* of fruiting below the surface, where they are out of the reach of currents of air, that the question naturally arises as to how the spores are distributed. This appears to be accomplished chiefly by artificial means, such as ploughing, or removing the material for covering root-crops, or for other agricultural purposes. The plasmodium of this species is "butter-yellow," and was first observed by Mr. C. Crouch at Kitchen End, Beds; it has since been seen at Stopsley Common, in the same county.

Badhamia ovispora Racib. is another interesting denizen of straw-heaps, and has been observed in various places extending from Nether Crawley, two miles east of Luton, to Barton, Beds, five miles northward; and in Bucks, nine miles west of Luton, on Wards Coombe Farm. In all cases it was found to have formed the sporangia at or above the line of saturation. Other species with a similar habit are *Physarum compressum*, *P. straminipes*, *P. Crateriachea*, *Craterium pedunculatum*, *C. leucocephalum*, *C. mutabile*, *Chondrioderma spumarioides*, *C. Michelii*, *Perichæna variabilis*.

Of species that are usually found at or near the surface of straw-heaps may be enumerated *Physarum calidris*, *P. didermoides*, *P. didermoides* var. *lividum*, *P. vernum*, *Fuligo septica*, *F. ellipsospora*, *Didymium nigripes*, *Spumaria alba*.

With reference to the habitats of the whole of the Mycetozoa that have come under our observation in this district, fifty-five per cent. have been found on wood only; seven per cent. on leaves; six per cent. on straw; seven per cent. on all three materials; and

ten per cent. on both leaves and straw. Apparently all the members of the following genera are limited to wood:—*Stemonitis*, *Brefeldia*, *Enerthenema*, *Lindbladia*, *Dictydium*, *Licea*, *Tubulina*, *Dictydiæthalium*, *Enteridium*, *Reticularia*, *Hemitrichia*, *Prototrichia*, *Lycogala*, and also most of the Trichias and Arcyrias.

The most prolific station for the Mycetozoa is a small coppice, some six or seven acres in extent, situated in the parish of Flitwick. It is practically a marshy alder swamp, some portions of which are always saturated with moisture, other parts being a tangle of briars, creepers, and ferns, under the moist shade of which "Myxies" luxuriate, especially in the early autumn. Altogether some sixty species have been collected within its area.

Among the more noteworthy species mentioned in the following lists may be specified *Lycogala flavo-fuscum* Rost. and *Physarum didermoides* Rost., found by Mr. C. Crouch; *Cribraria violacea* Rex, a first record for Europe, since observed at Lyme Regis; and *Trichia Botrytis* Pers. var. *munda*, a new variety.

The additional county records to those already published are marked with an asterisk; the others are new localities for the less common species. The arrangement and nomenclature followed is that of the monograph by Mr. Lister, to whom I express my grateful acknowledgments for his help in naming the specimens.

**Ceratomyxa mucida* Schroeter. Luton Hoo, Flitwick, Beds.

Badhamia nitens Berk. Ridgmount, Beds, *C. C.* — **B. macrocarpa*. Flitwick, Beds, *C. C.* — **B. ovispora* Racib. Barton, Stopsley Common, Nether Crawley, Beds.

Physarum compressum Alb. & Schw. Flitwick, Beds.—**P. stramipes* List. Chaul End, Nether Crawley, Maiden Common, Beds. —**P. didermoides* Rost. Mead Hook, *C. C.*, Nether Crawley, Beds. —*Var. *lividum* List. Chaul End, Nether Crawley, Stopsley Common, Beds.—**P. cinereum* Pers. Flitwick, Stopsley Common, Beds. —**P. vernum* Somm. Kitchen End, *C. C.*, Bedford, Warden Hills, Beds. — **P. diderma* Rost. Flitwick, Beds. — **P. contextum* Pers. Flitwick, Beds.—**P. conglomeratum* Rost. Flitwick, Beds.

**Fuligo ellipsospora* List. Stopsley Common, Beds, Sept. 1899.

**Craterium mutabile* Fr. Flitwick, Chaul End, Beds.

**Chondrioderma spumarioides* Rost. Ridgmount, *Miss E. Crouch*, Flitwick, Beds; Caddington, Herts.—*C. testaceum* Rost. Flitwick, Beds. Some seasons occurring in profusion. — **C. Michelii* Rost. Silsoe, *C. C.*, Flitwick, Beds; Kenesbourne Green, Herts. — **C. reticulatum* Rost. Flitwick, Beds. — **C. niveum* Rost. Flitwick, Beds.

**Diachæa elegans* Fries. Flitwick, Beds. — **D. subsessilis* Peck. Flitwick, Beds, *Miss G. Lister*. (Found since at Holt, Norfolk.)

**Didymium Trochus* List. Kitchen End, *C. C.*, Chaul End, Stopsley Common, Beds. — **D. Serpula* Fr. Flitwick, Beds, *C. C.* — **D. Clavus* Rost. Flitwick, Beds, *C. C.* — **D. nigripes* Fr. Bricket Wood, Herts. — *Var. *xanthopus*. Flitwick, Stopsley Common, Beds.

**Spumaria alba* DC. Flitwick, Chalton, Beds; Welwyn, Herts.

**Comatricha laxa* Rost. Flitwick, Beds. — **C. Persoonii* Rost. Flitwick, Beds; Ashridge, Herts. — **C. rubens* List. Flitwick, Chaul End, Beds.

**Lamproderma violaceum* Kost. Luton Hoo, Beds, on decayed poplar.

**Brefeldia maxima* Rost. Sewell, Luton Hoo, Beds.

**Dictydium cernuum* Schrad. Redbourn, Herts.

**Licea flexuosa* Pers. Russox Farm, Flitwick, Beds, *C. C.*

**Tubulina fragiformis* Pers. Luton Hoo, Beds; Oughton Head, Herts.

**Dictydiæthalium plumbeum* Rost. Kitchen End, Beds, *C. C.*

**Enteridium olivaceum* Ehrenb. Caddington, Herts.

Trichia Botrytis* Pers. var. *munda* List. Pepperstock, Herts.—T. contorta* Rost. var. *inconspicua*. Ashridge, Herts.

Perichæna depressa* Libert. Upbury, *C. C.*, Streatley, Beds; Birchin Grove Wood, Herts.—P. populina* Fr. Luton Hoo, *C. C.*, East Hyde, Beds.—**P. variabilis* Rost. Leagrave, Chiltern Green, Maiden Common, Beds.

**Margarita metallica* List. Ridgmount, Beds, *Miss E. Crouch.*

**Lycogala flavo-fuscum* Rost. Kitchen End, Beds, *C. C.*

SHORT NOTES.

Pyrola minor L. in Westmoreland. — In Mr. J. G. Baker's *Flora of the Lake District* (1885) no locality is given for the above plant in Westmoreland. In Watson's Top. Bot. ed. 2 (1883) it is, however, to be found for this county, with "Ottley hb." against the record; and Mr. Britten informs me that the full note in Watson's MS. runs—"Above the Waterfall, Ambleside (Mr. Just.). Otley Herb." Considering that much confusion has long existed amongst this and allied species, and records for *minor*, *media*, and *rotundifolia* need examining, it was doubtless upon this ground that *P. minor* was excluded for Westmoreland from Mr. Baker's *Flora*. It may therefore be interesting to mention that, in going through some specimens lately given me by Mr. A. J. Crosfield, I came across a sheet of undoubted *P. minor* with the Westmoreland locality of "Stock Gill Force, Ambleside," collected by Miss Wright, of Keswick, in 1843. Although I am told that records by Miss Wright and her father—a guide in the Lake District—must be taken with extreme caution, I see no reason why this particular station should be ignored, especially as it tallies so well with the locality described by Watson.—C. E. Salmon.

West Lancashire Additions (p. 40).—The interesting paper on more recent additions to v.-c. 60 by Messrs. J. A. Wheldon and Albert Wilson recalls to my mind two mistaken records which had slipped from my memory. A search for *H. diaphanum* Fr. at Longridge, to which species a specimen in my herbarium had been assigned, showed that *H. vulgatum* Fr. covered the railway banks in

the locality; and the specimen was no doubt a weather-worn *H. vulgatum*, with the involucre denuded of hair and down by a wet and smoky climate. *Milium effusum* L., which I see stands on my authority in the *Summary of Comital Plant-distribution* by Dr. F. A. Lees, p. 47, published in 1878, was an error. In the same *Summary* may be found recorded *Anthriscus vulgaris* Bernh. (p. 24), *Salix aurita* L., and *S. Caprea* L. (p. 39); these records in what is a summary of the previous Reports of the Locality Record Club Messrs. Wheldon and Wilson appear to have overlooked. *Saponaria officinalis* L. and *Senecio saracenicus* L. both grew in some quantity and well-established on or near the north bank of the River Ribble, just beyond the Redscar Woods from Preston, the former fringing the banks or hanging over the water in abundance; this was in 1873–75.—E. F. Linton.

Sphagnum medium.—To the list of stations given on p. 3 may be added White Moss, West Lancashire, where Mr. Albert Wilson and I had the pleasure of finding it last year. We are indebted to Mr. H. N. Dixon for the determination of the specimens.—J. A. Wheldon.

Schœnus ferrugineus.— This plant, recorded from Loch Tummel, in Perthshire, on the authority of specimens collected by myself in1884 (see Journ. Bot. 1885, 219, 289, t. 261), has since disappeared from that locality. When I led the Perthshire naturalists to the spot some years ago, not a plant was to be seen. It was very abundant in 1884.—James Brebner.

Impatiens Roylei (p. 50).—I found this species on Sept. 28, 1888, in Anchor Wood, Fremington parish, North Devon:—plant robust, 3–5 ft. high; leaves opposite, whorled in threes, or alternate; corolla pale rose-purple, with a short spur; not near any house or garden. A somewhat similar plant, probably the same species, was seen by a cottage in a lane in Alwington parish, North Devon, August 30, 1892, ten to twelve miles S.W. of the previous station. This species is usually credited with the synonym *I. glandulifera* Royle, Illustr. Himal. p. 151, t. 28, f. 2; non Arn. in Hook. Comp. Bot. Mag. i. p. 322. Judging only from the title-pages of the books cited, Arnott's *I. glandulifera* seems the older; apparently for this reason, that of Royle has been superseded, and the name *I. Roylei* adopted. On further investigation the case turns out otherwise. The title-page of Hook. Comp. Bot. Mag. vol. i. bears the date of London, 1835, but the dedication is dated Glasgow, July 1, 1836. The volume came out in parts, and page 322 did not appear until the year 1836, probably in May; at all events, on page 277 are found the words "on the 19th of the present month, Feb. 1836." The title-page of Royle's *Illustrations of Himalayan Plants* bears the date 1839, but the book appeared in parts at dates ranging from 1833 to 1840, of which a statement is given at the end of the prefatory matter. The part containing *Impatiens glandulifera* appeared in January, 1835; and this name must therefore be maintained. *Impatiens glandulifera* Arn. (1836) is thus left without a name, for the synonym *I. cornigera* Hook. (1852),

non Arn. (1836), is not available; being a Ceylon plant, the new name I. TAPROBANICA is proposed for it.—W. P. HIERN.

I noted this apparently wild at Madresfield, Oct. 12th, 1899, when the Worcestershire Naturalists' Club and Malvern Naturalists' Field Club held a joint meeting at Dripshill Wood. It grew by the side of a brook, and seemed well established there. The plant has glandular petioles, so is, I suppose, the var. *macrochila*.—CARLETON REA.

JUNCUS ALPINUS Vill. IN CUMBERLAND?—Looking up some Norfolk references lately, I came across the following note by Mr. H. D. Geldart, of Norwich (Trans. Norf. & Norw. Naturalists' Soc. vol. iv. p. 513, 1888). Speaking of the occurrence of *Juncus nigritellus* Auct. Angl. (non Don) at Wells, Norfolk, he observes:—"Of *J. nigritellus* D. Don, there are three good specimens in the Salmon Herbarium in the Norfolk and Norwich Museum, collected by Gr. Chambers at End Side Tarn, West Cumberland. Two of them might have been used as the models for part of Don's own plate in the E. B. S. No. 2643; and the third would have been named *Juncus alpinus* Vill. without much hesitation, had it been found on the continent instead of in England. As these three specimens were no doubt gathered at the same time and place, we have here a confirmation of the opinion which has been expressed by Mr. Beeby, that Don's plant is a variety of *J. alpinus;* and this opinion recalls that expressed by La Harpe long ago, and alluded to by D. Don in his article in E. B. S., that it is a variety of *J. ustulatus* Hoppe. However this question may be ultimately settled, I think that both the habit of growth and the shape of the capsules is too different in the plants from Wells and from East Side Tarn to regard them both as the same variety of any one species." It would seem well worth while for botanists going to the Lakes this year to search around this tarn, as I know of no record south of Perth.—ARTHUR BENNETT.

HIERACIUM SCIAPHILUM Uechtritz IN WORCESTERSHIRE.—I gathered plants of this species in a railway cutting near Upton-on-Severn on July 1st, 1897; and in Long Coppice, Leigh, on August 1st, 1898. It has not, I believe, hitherto been recorded for this county. I am sorry to have to cancel the record of *H. rigidum* for Worcestershire, which I made in this Journal for 1897, p. 313. The plant proved to be a rigid form of *H. sciaphilum*.—RICHARD F. TOWNDROW.

ROSA MELVINI.—I am able to record this very distinct rose from a new station about 1½ miles distant from its old habitat at Madresfield, where, I regret to say, it is dying. I met with it on July 12th, 1899, in a hedge at Leigh Sinton. There is an excellent description of the plant in the Supplement to *English Botany*, 3rd ed., pp. 162–3; but I cannot think it is rightly placed under *R. sempervirens*. Though much smaller in all its parts, it reminds me most of *R. arvensis* var. *bibracteata* (Bast.). Possibly it may be a cross between that vigorous plant and one of the small solitary-fruited varieties of the same species. I believe it to be sterile.—RICHARD F. TOWNDROW.

SOME ALGOLOGICAL LITERATURE OF 1899.

In *Flora* (Band 86, Heft 1, Jan. 28, 1899) is published the final contribution, "Ueber die Sexualität der Ectocarpeen," von Friedrich Oltmanns, to the discussion which took place in the same journal in 1897 between Prof. Oltmanns and M. Berthold, concerning copulation of swarm-spores in *Ectocarpus siliculosus*. M. Sauvageau also took part in this discussion, publishing a paper on the subject (*Mém. de la Soc. Sci. Nat. Cherbourg*, T. 30), in which he entirely sides with M. Berthold in accepting the occurrence of copulation in this species. Prof. Oltmanns had suspected that both these observers had been deceived by a spurious coalescence of swarm-spores with a species of *Flagellatæ*, which he had himself witnessed; while all his efforts to produce true copulation had failed. In the present paper Prof. Oltmanns withdraws entirely from his sceptical position, and declares that M. Berthold's results were perfectly right. He describes his own investigations in the spring of 1898 in Naples, and confirms M. Berthold's original observations in every particular. As a result of this confirmation, the author proceeds to deduce certain general views on the reproductive organs of *Ectocarpus*. In *E. siliculosus* there occur uni- and plurilocular sporangia, but the plurilocular are subdivided into gametangia and neutral sporangia, giving therefore no less than four different kinds of sporangia for this one species. This is not an isolated case, however, for *E. Padinæ* has been shown by M. Sauvageau ("Sur la sexualité des Phéosporées," *Journ. de Botanique*, 1896–7) to possess the same variety of reproductive organs, and he has described male and female sporangia for other species of *Ectocarpus* and for *Myrionema*. Prof. Oltmanns speculates on the origin of these various forms of sporangia, and suggests that the ancestral *Ectocarpaceæ* produced swarm-spores in plurilocular sporangia, which either copulated or germinated directly. In the course of development these "half-gametes" became differentiated, on the one hand, into swarm-spores, to which copulation was a necessity for further development; on the other, into "neutral" swarm-spores, which were incapable of copulation. This theory would explain the intermediate forms of swarm-spores seen by Prof. Oltmanns and M. Berthold in *E. siliculosus*. In *E. siliculosus* the difference between male and female spores is just recognizable, but it is strongly marked in *E. secundus*, *E. Lebelii*, and *E. Padinæ*. Hence the asexual swarm-spores are also sharply differentiated in this group, and from this fact Prof. Oltmanns infers that the asexual swarm-spores of *Phæosporeæ* are phylogenetically quite distinct from the zoospores of the unilocular sporangia. A further mode of reproduction in *Ectocarpaceæ* is the formation of aplanospores, which points to a connecting link with *Tilopterideæ*.

Prof. Oltmanns closes his interesting paper with a list of the forms of reproduction that might exist theoretically in one and the same species of *Ectocarpus* or *Tilopteris*. These are—

I. Unilocular sporangia, which form
  a. Normal zoospores.
  b. Aplanospores.
  c. Monospores (Akinetes) (?).

II. Plurilocular sporangia, which form
  a. Gametæ.
    α. Normal male and female.
    β. Parthenogenetic.
    γ. Aplanospores (?).
  b. Neutral swarm-spores.
    α. Normal.
    β. Aplanospores.

Truly a formidable list for one filamentous alga! As the author says, the forms of reproduction adopted by each species in real life depend on its inherited peculiarities, and still more on outside influences. Meantime it is of interest to have a summing-up of all possibilities even in our present state of fragmentary knowledge on the subject: it forms at least a framework into which fresh facts can be weaved, though the framework itself should at times have to undergo slight alteration.

The *Journal de Botanique* for April contains a paper by M. Sauvageau—"Les Acinetospora et la sexualité des Tilopteridacées"—which forms his second communication on this subject. It embodies the results of his investigation of *Acinetospora pusillus* Born., and the germination of zoospores from both uni- and plurilocular sporangia is described and figured. Besides these forms of reproduction, there is a third, which has been described as occurring in *Tilopteridaceæ* and in *Heterospora Vidovichii*—monosporangia. These bodies are minutely described by M. Sauvageau, who figures plants bearing monosporangia, as well as various stages of the germinating monospore. He proves conclusively that these bodies are true propagula or organs of vegetative reproduction, by their structure, their behaviour, and the variety of their size. On germination they either divide transversely or remain undivided. A creeping filament, which adheres to the substratum, is first sent out, followed, in the opposite direction, by a free filament with trichothallic growth. After a fortnight these plants produce pseudosporangia, borne on either kind of filament, while in the meantime the zone of trichothallic growth in the non-adherent shoots has disappeared, and all growth in the plant is limited to the creeping filaments or to the throwing out of fresh shoots. The pseudosporangia germinate in their turn, and form plantlets. M. Sauvageau alludes once more to propagation by cuttings among *Phæosporeæ*, and states that in this respect *Acinetospora* shows great facility, especially when the cutting is taken from a plant bearing pseudosporangia.

The author goes on to show that, from the similarity of their reproductive organs, *Heterospora Vidovichii* Kuck. must be placed in the same genus as *A. pusillus*, and, as *Acinetospora* is the older name, it must take precedence of *Heterospora*. He then suggests

that *Ectocarpus crinitus* Carm. may on further investigation prove to be the same plant as *A. pusillus*, and that even *A. Vidovichii* may not be specifically distinct from "the synthetic species" *Acinetospora crinitus*.

The next section of the paper deals with the nature of the two forms of monospores described in *Tilopteridaceæ*, those with a single nucleus, and those with four nuclei enclosed within the one membrane. This has been explained in various ways by different authors, but M. Sauvageau regards both forms of monospores as being of one and the same nature—*viz.* propagula; and the multiplication of the nuclei in the one case shows merely a commencement of germination. He entirely disfavours the idea of the monospore with four nuclei being an oosphere, and gives very strong reasons in support of his opinion. Finally, the author refers to the view of M. de Janczewski, that the *Phæosporeæ* were a very ancient group, of which a few varied types had survived. Especially would this apply to the *Tilopteridaceæ*. M. Sauvageau regards this family as being more nearly allied to *Ectocarpaceæ* and *Cutleriaceæ* than to any higher family in the group, and he considers that *Acinetosporeæ* and *Haplosporeæ* (= *Tilopterideæ*) should not be regarded as merely two tribes in the family *Tilopteridaceæ*, but should constitute two distinct families. The paper closes with a table showing the connecting links between *Ectocarpus* and *Cutleriaceæ*.

A further most interesting and valuable contribution to phycological literature by M. Sauvageau—"Les Cutlériacées et leur alternance de générations"—is published in the *Ann. Sci. Nat.* sér. 8, vol. x. Dec. 1899. Although this order has attracted the attention of many botanists from M. Thuret in 1850 onwards, there still remain points for further investigation; these are clearly set forth in this paper, while fresh facts are added to our knowledge of the subject. It would be impossible in a small compass to give any adequate account of this paper, for each chapter is full of side suggestions, as is only natural when such an interesting subject is dealt with by such a competent hand. To quote the author's own words in his introduction: "The reproduction of the *Cutleriaceæ*, in its complexity, is interesting not only to the algologist, but to all those who occupy themselves with general biology; it presents a special interest as regards the many points of view of sexuality and of parthenogenesis, of alternation of generations and of polymorphism, of the influence of external conditions on development, and of geographical distribution."

The first chapter is devoted to a *résumé* of previous work on this subject by Prof. Reinke, M. Falkenberg, M. de Janczewski, Dr. Kuckuck, and Mr. Church. The second deals with the *Cutleriaceæ* of the Gulf of Gascony, on the flora of which coast M. Sauvageau has published papers in the *Journal de Botanique* for 1897, and *Comptes rendus de l'Acad. des Sciences*, vol. cxxviii. (13 March, 1899). He records from Guéthary, where he worked, the three species of *Cutleriaceæ* which possess sexual organs: *Cutleria adspersa*, *C. multifida*, and *Zanardinia collaris*. This place and Tangier are, according

to M. Sauvageau, the only localities where all three plants are known to be co-existent. A new species of *Aglaozonia*—*A. melanoidea*—is described, and the author is of opinion that this is undoubtedly the sporophyte of *Cutleria adspersa*, instead of *A. chilosa*, as has been supposed. The two generations *A. melanoidea* and *C. adspersa* are found side by side in the same depth of water at Guéthary and at Tangier, while *A. chilosa* does not occur in either locality. "If *A. chilosa* were the sporophyte of *C. adspersa*, it must be admitted that at Guéthary and at Morocco *A. melanoidea* is reproduced solely by zoospores, *C. adspersa* solely by oospheres, either parthenogenetic or fertilized. Since the two plants live together at Guéthary, it seems more logical to admit their mutual dependence." Granted that this is the case, the author acknowledges that the same difficulty arises for the Naples plants, where *C. adspersa* and *A. chilosa* occur; but they do not grow near each other, and it is reasonable to suppose that *A. melanoidea* has been overlooked at Naples, as was at first the case at Guéthary. There remains therefore one sporophytic form for which no oophyte has yet been found—viz. *A. chilosa*—and M. Sauvageau suggests that it may belong to either *C. compressa* or *C. pacifica*; always supposing that it is not a variety of *A. parvula*, nor a form in the life-cycle of *Zanardinia*.

The third chapter deals with "The germinations which grow in nature on *Cutleria adspersa* at Guéthary." M. Sauvageau recognizes three forms of germination of the oophytic generation, which he denominates as "forme Falkenberg," "forme Thuret," and "forme Church," after the authors who first described them. In "forme Falkenberg" the germinating spore produces a small upright column of cells ("colonnette"), which bears one or more exogenous hairs, and adheres to the substratum by means of rhizoids. This is the *Keimfuss* of Prof. Falkenberg, but M. Sauvageau prefers the name "colonnette," to avoid confusion between this upright portion and the *Aglaozonia* thallus, which shortly develops at its base. The basal cells of the "colonnette" enlarge and proceed to divide, till they form a prostrate thallus, with patches of endogenous hairs on the upper side, and rhizoids below. The column is for a time persistent, but is liable to be broken off through its delicacy. M. Sauvageau believes that these "formes Falkenberg" are the result of parthenogenetic germination of the oosphere of *Cutleria adspersa*, and are the origin of *Aglaozonia melanoidea*, since the germination of the unfertilized oosphere of *C. adspersa* in a culture produces the same result. "Forme Thuret" is as common in nature at Guéthary as "forme Falkenberg." The germinating cell produces a simple filament, fixed to its substratum by one or more rhizoids. The lower cells of the plantlet are termed by the author the "zone thallogène," above which is the meristematic zone. This produces cells which enlarge the thallus below, and replace those which are broken off above. From the thallogenous zone a branch is soon given off showing the same meristematic growth, and shoots up alongside the original filament. As one branch after another is formed, the walls of each thicken, probably become adhesive, and at last unite to form "the

support of the thallus of *Cutleria adspersa*." Gradually the plantlet assumes a funnel-shape, and the cells become differentiated into a peripheral layer and an internal zone. At a later stage this infundibuliform thallus becomes torn open, while from its base and from the support rhizoids are given off, which give additional support to the plantlet. "A young *C. adspersa* is therefore composed of—(1) a support at first entirely pseudo-parenchymatous, which differentiates later a superficial layer of small cells by peripheral divisions transversely and longitudinally; (2) a thallus, at first funnel-shaped, later opened out, which is the true thallus of *Cutleria*." Whether or not this growth is the result of fertilization in the oosphere of *C. adspersa* is doubtful, but M. Sauvageau is of opinion that both the "forme Falkenberg" and the "forme Thuret" are the result of parthenogenesis. The "forme Church" is regarded by the author as abnormal, though instructive; it consists, as may be remembered, of the column, bearing the *Aglaozonia* plant at its foot, and the *Cutleria* above.

Chapter IV. describes the "Cultures of *Cutleria adspersa*." In M. Sauvageau's own experiments he has never seen the process of fertilization, though he has watched the moving oospheres for hours at a time; but the Falkenberg-plants which resulted from his germinated oospheres were precisely similar to those produced by the fertilized oospheres of M. de Janczewski. It is interesting to see that the colourless hairs of the *Phæophyceæ* play a prominent part in these young plantlets. The author never succeeded in producing either a "forme Thuret" or a "forme Church," but, since he succeeded in germinating an oosphere parthenogenetically, he confirms Mr. Church in disproving the statement of MM. Falkenberg and Janczewski that germination is confined to fertilized oospheres. He concludes this chapter by maintaining "that the oospheres of *Cutleria*, fertilized or parthenogenetic, like the zoospores of *Aglaozonia*, produce on germination either the 'forme Thuret' or the 'forme Falkenberg,' according as they are acted upon in one sense or another by conditions which for the rest we are unable to define." He suggests that a study of the nuclei in the oospheres of *Zanardinia* and *Cutleria* and of the zoospores of *Zanardinia* and *Aglaozonia* might help to throw light on the situation.

"The epiphytic plantlets of *Cutleria multifida*" is the subject of Chapter V., wherein the author compares the "forme Falkenberg" of this plant with that of *C. adspersa*.

The final Chapter, VI., contains a "*Résumé* and conclusions," full of interest and suggestion. M. Sauvageau regards the "colonnette," which plays the intermediate part between the germination of the oosphere and the production of the *Aglaozonia* plant, as a growth of the greatest phylogenetic importance. Its physiological *rôle* is insignificant from its diminutive size, but morphologically, as necessary to the origin of *Aglaozonia*, its importance is considerable. "It is a pro-embryo, but an atavic pro-embryo. The determination of its true nature would be of as great weight for the determination of the affinities of *Cutleriaceæ* as the knowledge of the origin of the thallus and the structure of their reproductive organs.

A *Cutleria* is not a synthesis of two, but of three genera—*Cutleria* proper, *Aglaozonia*, and the 'colonnette' of a genus unknown." M. Sauvageau compares this "colonnette" with other genera of *Phæosporeæ*, and considers that it most nearly approaches *Myriotrichia* and *Litosiphon*. Finally, he gives a table of affinities of the different parts of a *Cutleria*, ranging from *Ectocarpus* to *Laminaria*, which opens up wide fields for speculation.

The second part of the "Beiträge z. Kenntniss der Meeresalgen," by Dr. Kuckuck, published in *Wissenschaftliche Meeresuntersuchungen*, vol. iii., has been published separately by the "Biologische Anstalt auf Helgoland." It contains Nos. 5 to 9 inclusive, and is, like the first part issued in 1897, sumptuously illustrated. In No. 5, which is entitled "Ein neuer *Asperococcus* mit beiderlei Sporangien," Dr. Kuckuck describes and figures in various stages a small species of *Asperococcus* found in the Adriatic, which he calls *A. scaber*. Unlike the other known species of this genus, this plant arises from a horizontal basal disc, which adheres by means of rhizoids to the substratum. Its height is about 3–4 mm., and it is solid throughout. Both kinds of sporangia arise as outgrowths from the cortical cells, intermingled with hairs and, in the case of the unilocular sporangia, with paraphyses (called here "stacheln"). The hairs are figured sometimes with, sometimes without, the basal sheath, which has been described for this and a few other genera by M. Sauvageau. Presumably, however, this sheath is always present round the hairs of *A. scaber*. The strong resemblance between the figures of this plant in its young stages and those of the "colonnette" of *Cutleria* figured by M. Sauvageau in the paper described above is very striking. The slender upright column with the characteristic hair at the apex, the absence of branching, the basal disc with its rhizoids—all these recall irresistibly the mysterious unknown genus which connects *Cutleria* and *Aglaozonia*. Although the figures of the older plants bearing the sori dispel this resemblance, one cannot but remember that M. Sauvageau compares his "colonnette" with a young *Asperococcus* (l.c. p. 358); pointing out that the latter bears endogenous hairs and becomes fistulous as the plant increases in age, while the "colonnette" is solid and bears exogenous hairs. It is interesting to see that *A. scaber* is also solid, and its hairs are not endogenous. Dr. Kuckuck figures an interesting example of *A. scaber* bearing hairs and plurilocular sporangia, the latter growing either directly from the basal disc, or borne on short filaments arising from the disc. These plants were produced under culture, and may therefore be abnormalities; but the author promises to deal with this occurrence in a later paper.

In Abhandlung 6, "Die Gattung *Myriotrichia*," the six recognized species of this genus are dealt with in detail, and beautifully figured. Under *M. repens*, the remarkable likeness is pointed out which exists between this plant and *Streblonema sphæricum*, not in any way as implying a specific unity, but as a curious coincidence. A full diagnosis is given of this species and *M. Protasperococcus* Berth., as well as for the genus itself. *M. Protasperococcus* has till

now been a *nomen nudum*, but Dr. Kuckuck has fortunately been able to examine and describe this species from plants found by himself in the Adriatic, and compared with M. Berthold's specimens. Although *M. Protasperococcus* shows several marked differences from the other species of the genus, Dr. Kuckuck decides on retaining it in its present position, instead of adding another to the already too large number of monotypic genera in *Phæosporeæ*. He contents himself instead with showing its relationship with other algæ, and finally gives us the long-needed diagnosis. *M. canariensis* Kütz. is regarded as possibly a form of *M. clavæformis*.

"Ueber den *Ectocarpus investiens* der Autoren" sums up our previous knowledge of this plant, and shows that it is identical with *Cylindrocarpus microscopicus* Crn., as well as with *Streblonema investiens* Thur., which had been previously recognized. Excellent description and figures are given of the characteristic "rhizoids" which serve to connect together the filaments in the upper portion of the plant. After pointing out the relationships with other *Phæosporeæ*, the author concludes with a full and clear diagnosis.

"*Compsonema*, ein neues Genus der *Phæosporeen*" is the eighth item in this fascicle. The species *C. gracile*, for which the genus was founded, occurs on stones in the Adriatic, and belongs to the family *Myrionemaceæ*. The points of difference are given between this genus and M. Sauvageau's *Hecatonema* and *Chilionema*.

The final division (9) of this paper is entitled "Ueber den Generationswechsel von *Cutleria multifida* Grev." It confirms and amplifies the work published on this subject by Mr. Church in the *Annals of Botany*, vol. xii. No. xlv., March, 1898, and adds much interesting detail of the minute structure of *Aglaozonia*. An account is given of the methods used by Dr. Kuckuck in cultivating his *Aglaozonia* spores, which resulted in many cases in his producing the form of which the upper part becomes a young *Cutleria*. From some of Dr. Kuckuck's figures it would appear that the "colonnette" of M. Sauvageau had been found in fruiting condition; but the latter author, in describing this paper of Dr. Kuckuck (*l. c.* p. 285) says he believes the plants figured are etiolated, and consequently unnatural. It is in any case interesting to see that the production of oogonia may take place in such a very young and fragile stage of growth. A section is given to "The outward physical conditions, especially the relations of the temperature of the water."

Among the novelties for the year 1899 published in American journals are "Three undescribed Californian Algæ," by Prof. Farlow, in the August number of *Erythea*, p. 73. These are *Dictyopteris zonarioides*, *Spermothamnion Snyderæ*, and *Polyopes Bushiæ*, each of them being represented in the Phycotheca Boreali-Americana, under Nos. 581, 598, and 600 respectively. The April number of *Erythea* contains a short paper, "New and Little-known Brown Algæ of the Pacific Coast," by Prof. De Alton Saunders, wherein he describes a new genus of *Elachistaceæ*—*Hapalospongidion*. The species for which this genus is created is *H. gelatinosum*, and a full description of it is accompanied by figures. *Leptonema fasciculatum* Reinke is recorded for the first time from the

Pacific, growing on *Postelsia palmæformis*, but bearing only plurilocular sporangia.

"Notes on two *Lithothamnia* from Funafuti," by Dr. M. Foslie (*Kgl. Norske Videnskab. Selskabs Skrifter*, 1899, No. 2), is a short paper, the forerunner of a fuller account of calcareous algæ from the scene of the coral-reef boring. One of these two corallines is a var. *funafutiensis* of *Lithothamnion Philippii* Fosl., and the other is the *Goniolithon oncodes* Fosl., already recorded from New Guinea. Mr. Isaac Holden publishes in *Rhodora* for November "Two new species of Marine Algæ from Bridgeport, Conn." They are *Hydrocoleum majus* and *Stictyosiphon subsimplex*, distributed in Phycotheca Boreali-Americana as No. 602 and 630 respectively. Both are figured.

A "Note sur quelques Algues rapportées par le yacht Chazalie," by Madame Weber van Bosse (*Journal de Botanique*, No. 5, Mai, 1899), records *Acetabularia Peniculus* Solms from Bahia Honda, *Chalmasia antillina* Solms from Martinique, and describes a new species of *Codium*—*C. Chalazei*, from Branco, near Cape de Verde.

The veteran phycologist Prof. J. G. Agardh has brought out a Continuatio V. to his *Analecta Algologica*, containing many new genera and species, mainly from Australian and American shores. He gives a systematic disposition of *Gigartina*, which contains sixty-nine species, including several new ones. *Sarcomenia* is also treated at some length, and two new species—*S. opposita* and *S. secundata*—are described, both from Australia. The section of most interest, however, is that relating to the transference of the monotypic genus *Bracebridgea* from *Siphoneæ* to a position between *Wrangelia* and *Spyridia* on the one hand, and *Furcellaria* and *Spongiocarpiæ* on the other. The presence of calcium carbonate in the obovate terminations to the cortical filaments and the absence of any form of fructification had misled the author in his earlier examination of the plant, but, although no fruit has yet been found, it has been possible on the grounds of vegetative characters to determine approximately the position of *Bracebridgea* among the *Florideæ*. Prof. Agardh describes a new genus of *Fucaceæ*, which he calls *Scænophora*, placing it near *Cystoseira*. The single species, *S. australis*, was sent from South Australia by Miss Hussey, and is regarded by Prof. Agardh as a simple form of the type of *Cystoseira*.

In a paper "On *Notheia anomala*," by E. S. Barton (*Journ. Linn. Soc.* xxxiv. No. 239, Nov.), the author describes the mode of growth of this parasitic alga from the penetration of the germinating filament into the host-plant through its various stages to maturity. The antheridia of *Notheia* are here described for the first time, though they had evidently been recognized previously by Mr. R. M. Laing, of Christ Church, New Zealand. In a private letter, subsequent to the publication of this paper, Mr. Laing sends to the author a memorandum of a note made, among others on *Notheia*, some years ago: "Scraped some brown mucilaginous material from the tip of the stem of *Notheia:* it contained oospheres and antherozoids of the ordinary fucaceous type." The origin of the branches

from the initial cell of the cryptostoma has been previously described, but is here refigured from new preparations. So far as is known at present, this is the only case of such a growth from the initial cell, though a study of the initial cells of cryptostomata in other orders than *Fucaceæ* might lead to interesting results. This cell in all known cases is arrested in its growth in an early stage of the development of the plant; it is therefore essentially one which belongs to the young plant, and should serve as a guide in pointing to any change of cell-structure which might occur during the life-history of the alga. In the case of *Soranthera ulvoidea* (Journ. Linn. Soc. Bot. vol. xxxiii. p. 479 *et seq.*) cryptostomata are described as occurring in a plant which shows different forms of peripheral cells in the early and late stages of its life-history. The initial cell of the cryptostoma, starting as it does in the very young plant, retains permanently the character of the loose-celled tissues of the young plant. May this not be an explanation of the peculiar initial cell described and figured for *Splachnidium rugosum* in Murray's *Phycological Memoirs*, pt. i. p. 1 et seq.? Here the initial cell of the cryptostoma, which subsequently becomes a conceptacle bearing sporangia, is connected with the internal cells of the plant by a long filament, arising directly from one of the thick central filaments. In the mature conceptacles here figured this appendage to the initial cell has a somewhat peculiar effect; but, judging from the analogy of *Soranthera* and other algæ, it might lead one to suppose that this cell is merely the relic of the early peripheral structure of *Splachnidium*, and that in the youngest stages of this plant all the periphery was composed of cells connected in this manner, more or less closely, with the internal filamentous cells. In *Soranthera ulvoidea* the closely connected cells of the epidermal layer were a later formation in the life-history of the alga, and it is easy to suppose that the same thing may occur in *Splachnidium*. However, nothing but an examination of the youngest plants of this alga can solve the mystery of this initial cell, or explain the so-called "apical" cell, which exactly resembles it.

In a paper by Mr. Ernest Küster, "Ueber Vernarbungs- und Prolificationserscheinungen bei Meeresalgen" (*Flora*, Band 86, heft ii. H, Mai 20, 1899), the author deals with his subject under four headings:—1. Scar-membranes. 2. Scar-tissue. 3. Prolification. 4. Vegetative reproduction. In the first division he speaks of the effect of an injury on *Codium* and *Anadyomene*, the former plant being apparently without the power of forming any membrane over the injured place, while in *Anadyomene* the wall of the long cylindrical cells is not only closed together by a new membrane within twenty-four hours, but that cell retains also the power of growth. Herr Küster carefully remarks he does not find this power of fresh growth in every instance where an injury has been closed by a new membrane; he would only imply that at least in some cases this does occur.

The second part describes the tissue formed by the plant round an injured part of the thallus, as is often seen in members of

Fucaceæ; such injury being presumably the result of attack by fishes, etc. As distinct from such causes, however, is the gall-tissue found on many algæ surrounding colonies of bacteria or forming a nest for small parasitic animals. Dr. Küster does not seem conversant with the literature on this subject, small though it is, for he alludes to the paper by Prof. Schmitz as being the one exhaustive work on gall-formation in algæ. Work has, however, been done by Magnus on malformation caused by *Chytridiaceæ* in *Ceramium*, and the *Vaucheria* galls have been described by Vaucher (*Conferves d'eau douce*, t. iii. 1803) and Balbiani (*Ann. Sci. Nat. Zool.* ser. 6, t. vii. 1878). The galls on *Ascophyllum nodosum* caused by *Tylenchus fucicola*, a nematode worm, are fairly common, and are described in Murray's *Phycological Memoirs*, pt. i. p. 21, 1892, while the copepoda galls on *Rhodymenia palmata* were described and figured in this Journal for March, 1891. The subject of gall-formation among algæ would well repay further study both to the botanist and the zoologist.

The third division of Dr. Küster's paper treats of the proliferous outgrowths so frequently found in some algæ. He negatives the statement of Kützing that in some cases these outgrowths take place from the base of cryptostomata; indeed the only case of any such growth is in *Notheia anomala* and in that alga the shoot from the base of the cryptostoma is not the result of any injury, but is the natural mode of branching. A list is given of algæ bearing abnormal proliferous outgrowths; it is also noted that this growth takes place, as a rule, from the midrib, and by no means necessarily in absolute proximity to the injured place, the prolification being sometimes as much as several millimetres distant. The author suggests dividing into two groups those algæ which show proliferous outgrowths: one containing those which produce prolifications while still uninjured, the other containing those in which such growth is the result of accident or injury. But for the serious consideration of such grouping, as tending to show any true relationship, much proof would have to be brought together. The object of this formation of new thallus is presumably the replacement of assimilatory tissue, and the author suggests, as a continuance of this line of investigation, that note should be made as to which algæ are most attacked by animals, and what, if any, are their modes of self-preservation. It would be interesting to see how far injury and proliferous growth are interdependent.

The last division deals with the vegetative reproduction of algæ, notably that of *Padina pavonia*, which the author describes from his own experiments. As the result of an injury, the under side of the thallus of this alga became clothed with a "velvety covering" of young individual plants, the young stages of which are here figured. Dr. Küster closes his paper with the remark that vegetative reproduction as the result of serious injury is probably far more common than has been supposed, and refers to the work done in this direction on *Haplospora globosa* and *Phæospora tortilis*.

ETHEL S. BARTON.

(To be concluded.)

NOTICES OF BOOKS.

Monographieen Afrikanischer Pflanzen-Familien und Gattungen. III. Combretaceæ—Combretum. Bearbeitet von A. Engler und L. Diels. Mit Tafel i–xxx und 1 Figur im Text. 4to. Oct. 1899.

Probably the most important order of plants in the African forests is the Leguminosæ, and next to this may be reckoned the Combretaceæ: we therefore gladly welcome the present work, which contains a concise and carefully elaborated account of *Combretum*, the largest genus in this latter order. The Combretaceæ in Oliver's *Flora of Tropical Africa* were published in 1871; Lawson there enumerated forty-six species of Combretum, and four of *Cacoucia*. In the present volume there are 184; so that it will be seen that our increase in knowledge is considerable.

The authors unite with *Combretum* the genera *Cacoucia*, *Campylogyne*, and *Campylochiton*. The first of these was established by Aublet, in 1775. He described and figured the fruit as 5-angled — a character which has been called in question, but which is borne out by Guiana specimens in the Kew Herbarium (Jenman, No. 355). *Cacoucia* is here employed as a section to include the American plant and four African species—*C. velutinum* (S. Moore), and *C. bracteatum*, *C. nervosum*, and *C. Lawsonianum* of the present monograph. But in *C. bracteatum* (*Campylochiton platypterus* Hiern), a plant of which the structure of both flowers and fruit is well known, the upper portion of the receptacle is of an entirely different shape, being cylindrical, campanulate, and inflated and sulcate from the base nearly to the middle; within, horizontal scales shut off the lower portion as a separate chamber. The fruit is conspicuously winged, the wings being 1·8 cm. broad. We are surprised to find that the authors consider this structure in accord with that of Aublet's genus.

The genus *Campylogyne* was separated by Mr. Hemsley from *Cacoucia*, from which it differs in the absence of horizontal scales forming a diaphragm, and especially noticeable on account of the adherent geniculate style. In the work before us it constitutes the twenty-sixth section of Combretum, eight plants being referred to it. The style is adnate to the receptacle, sometimes near the base, as in *C. exannulatum*, *C. Hensii*, and *C. Poggei*; sometimes higher up, as in *C. mussændiflorum*. The authors place *C. oxystachyum* Welw. in this group. It has not the long generally curved receptacle which is usual, and the style is not adnate, so its position here seems to need reconsideration, The genus *Pteleopsis* was founded by Dr. Engler (*Pflanzenwelt Ost-Afrika*, Theil c. p. 293), on a single species, *P. variifolia*. The racemes have numerous staminate slenderly pedicelled flowers below, and a few hermaphrodite flowers above; the fruit is there referred to as generally 2-alate, rarely 3-alate. The authors now refer to this genus *C. anisopterum* Welw. and *C. dipterum* Welw., and *C. myrtifolium* Laws. The pteleoid nature of the fruit is very apparent in *C. dipterum*, but

not so in *C. anisopterum*, which generally has three or four wings, and the diagnostic character of the genus has had to be modified to admit of this.

The authors divide *Combretum* into numerous groups, depending largely on whether the flowers are tetramerous or pentamerous, and on the shape of the upper portion of the receptacle and the character of the disc. Thus, for instance, in the first section, *Hypocrateropsis*,we have tetramerous flowers, the upper portion of the receptacle patelliform, and a generally distinctly 4-lobed disc, while in the section *Cacoucia*, previously mentioned, the flowers are showy and pentamerous, the upper portion of the receptacle is hollow and campanulate, the disc cupuliform. Between these extremes almost every modification in the shape of the receptacle seems to occur.

The authors have been fortunate in the mass of material which they have been able to examine for the purposes of this monograph. Not only are there large collections in Berlin, but they have had the loan of specimens from Zurich, Hamburg, Coimbra, Brussels and Rome. Notwithstanding this, there are still certain portions of Africa from which the monographers have seen hardly any material—*e. g.* from Rhodesia, a region which the collections of Dr. Rand in the National Herbarium show to be rich in Combretaceæ.

As will always be the case in a work of this magnitude, there are numerous points of detail which suggest remark. In the National Herbarium the types of Don's African plants are preserved; these, like the types of several of Welwitsch's Angolan species, have not been seen by the authors. Some revision seems necessary in the case of certain of the latter—*e. g.*, the authors unite under *C. paniculatum* Vent. var. *virgatum* Engler and Diels, *C. virgatum* Welw. and *C. virgultosum* Welw. The diagnostic character is "frutex; foliis adultis manifeste tomentellis; ramulis floriferis e ramis virgatis ortis valde abbreviatis"; but *C. virgatum* bears its flowers in dense short axillary branches, and has leaves which are velvety tomentose below, while in *C. virgultosum* the lateral branches of the inflorescence are often 10–12 cm. long, and the leaves of the flowering branches are almost glabrous. There are some omissions: we cannot find *Combretum* (*Poivræa*) *muweroense* (Baker in *Kew Bulletin*, 1895, p. 290), and several other species. The excellent plates are of great service, and we trust the remaining portions of the order will meet with a similarly liberal treatment.

E. G. B.

Orchidacearum Genera et Species. Exposuit Fritz Kraenzlin. Vol. i., Fasc. 9–12. 8vo, pp. 513–768. Berlin: Mayer & Müller. 1893–1900.

Fascicles 9–12 of Dr. Kraenzlin's work on Orchids comprise the end of Tribe II. *Habenarieæ*, the whole of Tribe III. *Gymnadenieæ*, and a large portion of Tribe IV. *Satyrieæ*, of the monandrous *Orchideæ*. With slight modifications the *Gymnadenieæ* appear as

delimited by Pfitzer in the *Pflanzenfamilien* (ii. Abt. 6, 91); Dr. Kraenzlin, however, prefers to include also the genera *Brachycorythis* Lindl. and *Schizochilus* Sond., making the latter a section of *Gymnadenia*. *Neolindleya* is a new genus, founded on the north-east Asiatic *Platanthera decipiens* Lindl., but distinguished by the complete absence of the stalked gland-discs and its stigma characters. We note also that *Holothrix* bears a wider significance than has recently been assigned to it by several workers on the Order. Pfitzer, for instance, considered as distinct both *Scopularia* Lindl. and *Derœmera* Rchb. f.—or, as he erroneously spelt it, *Derœmeria*. In this Journal for 1895 (p. 277), in conjunction with Mr. Schlechter, we extended the latter genus, thinking it would be useful to include several species which differ strikingly in habit from the other species of *Holothrix*, as well as in characters of the column and stigma. Mr. Rolfe, in the *Flora of Tropical Africa* (vii. 195, 1898), took a similar view. Like Pfitzer, we all fell into the error of writing *Derœmeria*. Dr. Kraenzlin cannot accept our views on the limits of the genera, and includes *Derœmera* in *Holothrix*, pointing out at the same time the misspelling. Unfortunately he makes a second error in so doing, and starts a genus *Deromeria*, and on the same page another, *De Rœmera*. The former is no doubt a slip, but for the latter there seems no justification. On p. 575 it is stated that Reichenbach wrote *De Rœmera*, but the spelling in the original description is *Derœmera*, which form Dr. Kraenzlin also uses. We have, however, previously mentioned the recurrence of errors and inconsistencies in citation and reference which should have been avoided in an important work of the kind.

In our notice of previous fascicles we gave the date of their arrival at the Department of Botany. It is of course recognized that this is not beyond criticism, but such a date is at any rate less vague than that given on the fascicle. We venture to hope that, when the volume is complete, a list will be given of the actual date of publication in Berlin of each part—as is done, for instance, by the Linnean Society in connection with its Journal and Transactions.

A. B. R.

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*ARTICLES IN JOURNALS.**

Bot. Centralblatt (No. 5: 24 Jan.).—R. Feitel, 'Zur Vergleichenden Anatomie der Laubblätter bei den Campanulaceen der Capflora' (concl.). — S. Korshinsky & N. Monteverde, 'Bestäubungsversuche an Buchweisen.'—(No. 6: 1 Feb.). K. Muller, 'Bryologische & hepaticologische Fragmente.' — (Nos. 6 & 7). E. H. L. Krause, 'Floristiche Notizen.' — (No. 7: 7 Feb.). E. Lemmermann, '*Spirodiscus* Eichwald oder *Ophiocytium* Naegeli?' —(No. 8:

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* The dates assigned to the numbers are those which appear on their covers or title-pages, but it must not always be inferred that this is the actual date of publication.

14 Feb.). M. Rassmann, 'Eine bisher nicht beobachtete Missbildung bei *Stachys Germanica*.' — K. Müller, 'Zusammenstellung der Lebermoose aus dem Reichslande Elsass-Lothringen.'

Bot. Gazette (31 Jan.). — J. B. Pollock, 'Mechanism of root curvature.'—W. G. Farlow, 'Botanical Bibliography.'

Bot. Notiser (häft 1 : 15 Feb.). — O. Borge, 'Schwedisches Süsswasser-plankton.' — T. Vestergren, 'Verzeichnis nebst Diagnosen und Bemerkungen zu meinem Exsiccatenwerke 'Micromycetes rariores selecti.''

Bot. Zeitung (1 Feb.).—F. G. Kohl, 'Die paratonischen Wachsthumsverkrümmungen der Gelenkpflanzen' (2 pl.).

Bull. Soc. Bot. France (xlvi. 6–7 : Feb.).—J. Drake del Castillo, 'Les *Vernonia* de Madagascar.'—C. A. Picquenard, 'Dispersion des lichens bretons.' — M. Gandoger, 'Plantes nouvelles pour les Iles Açores.'—A. Battandier, 'Paronyques Algériennes.'—Id., 'Plantes de la Flore Atlantique.' — J. Briquet, 'Buplèvres de l'herbier de Linné.'—J. Foucaud, '*Trisetum Burnoufii*.'—L. Lutz, 'Sur l'ovaire du *Cytinus*.'—A. Franchet, 'Les *Swertia* et Gentianées de la Chine.' — —. Godefrin, 'Double coloration par le violet neutre.' — E. A. Finet, 'Une fleur monstrueuse de *Calanthe veratifolia*.'

Bull. Torrey Bot. Club (24 Jan.). — C. C. Curtis, 'Turgidity in Mycelia.' — C. H. Peck, 'New Fungi.' — H. N. Rusby, 'South American Plants.'—A. Nelson, 'New Plants from Wyoming.'

Gardeners' Chronicle (3 Feb.). — W. Roberts, 'The London Botanic Garden.'—(17 Feb.). G. Massee, 'A Conifer Disease.'

Journal de Botanique (Jan.: received 17 Feb.). — P. Van Tieghem, 'Sur les Stachyuracées et les Kœberliniacées.' — E. G. Camus, 'Plantes hybrides spontanées de la flore européenne.'

Mémoires de l'Herb. Boissier (No. 2: 18 Jan.). — T. Herzog, 'Einige biologische Notizen aus Graubünden und Wallis.'—(No. 3: 31 Jan.). E. de Wildeman, *Micromyces Mesocarpi*, sp. n.—(No. 4: 31 Jan.). H. & P. Sydow, 'Fungi aliquot novi a F. Stuckert in Argentina lecti.' — (No. 5: 31 Jan.). E. A. Wainio, 'Reactiones lichenum a J. Müllero descriptorum.' — (No. 6: 20 Feb.). K. Müller, 'Revision der Hepaticæ in Mougeot-, Nestler-, und Schimper Stirpes kryptogamæ.'

Oesterr. Bot. Zeitschrift (Feb.).—J. M. Polak, 'Untersuchungen über die Staminodien der Scrophulariaceen' (2 pl.). — A. Jenčič, 'Untersuchungen des Pollens hybrider Pflanzen.' — B. Fleischer, 'Zwei neue Compositen-Bastarde.' — J. B. Scholz, 'Studien über *Chenopodium opulifolium*.'—J. Murr, 'Zur Kenntniss der Hieracien von Kärnten und Steiermark.'

Rhodora (Feb.). — E. Brainerd, 'Blackberries of New England.' —R. G. Leavitt, 'Relation of plants to atmospheric moisture.'— M. L. Fernald, '*Artemisia Stelleriana* in New England.'

Trans. Linnean Society, 2nd Series, v. part 11 ("July, 1899," received December). — A. J. Maslen, 'Structure of *Lepidostrobus*' (3 pl.). — (December, 1899). A. B. Rendle, 'Systematic Revision of *Najas*' (4 pl.).

BOOK-NOTES, NEWS, &c.

Two new parts of Dr. Urban's important *Symbolæ Antillanæ* have lately reached us, each bearing the date Jan. 15 as that of publication: we cannot too highly commend this indication, which is too often neglected in publications of the kind. Part 3, concluding the first volume, contains a number of Porto Rico novelties described by the editor, who also undertakes the *Sabiaceæ*; the other contents are *Juncaceæ* by Prof. Buchenau, and *Eriocaulaceæ* by Dr. Ruhland, whose name is new to us. The first part of the second volume begins with a short list of additions to the excellent bibliography already published, but is mainly occupied by an instalment of Mr. C. B. Clarke's elaborate description of the *Cyperaceæ*, two hundred and forty-one species of which are here given. The synonymy is very fully given, but we regret to see that a number of manuscript names are cited therein; this seems an unnecessary burdening of nomenclature with useless additions.

Mr. G. S. Boulger is publishing in the *Essex Naturalist* what promises to be an interesting "History of Essex Botany," beginning with "The Botanists of the Sixteenth and Seventeenth Centuries." The editor of the magazine would do well to indicate on each instalment the actual date of issue: the number to which we refer is dated "April–Sept. 1899," but did not appear until considerably later than the latter of these months.

In *Bulletin* No. 17 of the U.S. Department of Agriculture (issued Nov. 22, 1899), Mr. Erwin Smith gave us the results of his study of the wilting of Cotton, Melon, and Cow-pea plants. The disease in each case is due to a fungus of the ascomycetous group, which he has described as a new genus, *Neocosmospora*. The mature fungus resembles a bright red *Nectria* with globose brown ascospores, and three conidial stages, forms of *Cephalosporium*, *Fusarium*, and *Didium*. The disease is widespread and destructive in many American States, but it does not seem yet to have crossed the Atlantic. *Neocosmospora* is peculiarly a soil fungus; it passes the winter in the soil, and enters the plant through its underground parts. It first fills the vessels of the host, causing a sudden wilt of the foliage; then as the plant dies the fungus invades the other tissues and fruits on the surface, first the conidial stage, and finally the perithecia. It is of great interest that Mr. Smith has been able to follow the whole life-cycle of the fungus in his cultures. It is comparatively easy to germinate ascus spores and so determine the conidial form, but in only a very few cases has it been possible to complete the circle and produce perithecia from conidia. The

author has provisionally stated that the cases of wilting on the three plants mentioned above are due to variations of the same species of *Neocosmospora*. He failed, however, to inoculate from one plant to the other; soil in which Melon wilted very quickly proved harmless to Cotton and Cow-pea. The same results have frequently been obtained in the case of *Uredineæ;* forms that are morphologically similar, yet prove to be distinct biological species. Mr. Smith is to be congratulated on the successful results of his long and careful experiments.—A. L. S.

The first part has just appeared of what seems to be an excellent *Conspectus Floræ Græcæ* by Dr. E. v. Halácsy. We hope to say more of it later.

The New York Garden, in addition to its other publications, has begun to issue a Journal, under the editorship of Dr. D. T. Macdougal, which is to contain "notes, news, and non-technical articles of general interest." We note, by the way, that the Kew *Bulletin* continues to present an example of "arrested development": no number has appeared since that for "September and October, 1899."

The recent part (dated Dec. 29, 1899) of *Minnesota Botanical Studies* is mainly devoted to Mr. Bruce Fink's investigations into the lichenology of Minnesota. Mr. E. M. Freeman writes on *Chlorochytrium* and Mr. F. K. Butters on *Rhodymenia*, each paper being illustrated; and Mr. K. C. Davis gives a systematic conspectus of the native and garden Aquilegias and Aconitums of North America.

We regret to record the death of M. Adrien Franchet, who has for twenty years been attached to the Paris Muséum d'Histoire Naturelle, and whose name for more than that period has been intimately associated with Chinese botany. He was successful in interesting the French missionaries in China in botanical work, and worked out many of their important collections, which included a very large proportion of novelties. Before taking up Chinese plants, M. Franchet's name was familiar to botanists as the author, in conjunction with M. Savatier, of the useful *Enumeratio Plantarum Japonicarum*.

Messrs. Backhouse, of York, issue a quarto list of "Botanical Material" specially selected and prepared for use in botanical laboratories, etc. It is very comprehensive and should be useful, although the very large number of misprints (which the fairly long list of "errata" by no means exhausts) does not prepossess one in its favour. The terms on which specimens are supplied are appended; these suggest that if botanical lectures should become common a new and remunerative branch of industry might be opened up—"Narcissus flowers, fresh, 1s. 6d. to 3s. dozen" must leave an ample margin of profit; and *Lamium Galeobdolon* or *purpureum*, "inflorescence from 1s. doz." would well repay the collector. There is a useful index.

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SENIOR ASSISTANT, DEPARTMENT OF BOTANY, BRITISH MUSEUM (NATURAL HISTORY)

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Senior Assistant, Department of Botany, British Museum (Natural History).

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Without professing to occupy the vast field of general Botany, the Journal has from its inception filled a position which, even now, is covered by no other periodical. It affords a ready and prompt medium for the publication of new discoveries, and appears regularly and punctually on the 1st of each month. While more especially concerned with systematic botany, observations of every kind are welcomed. Especial prominence has from the first been given to British botany, and it may safely be said that nothing of primary importance bearing upon this subject has remained unnoticed.

Bibliographical matters have also received and continue to receive considerable attention, and the history of many obscure publications has been elucidated. Every number contains reviews of new and important books written by competent critics: in this as in every other respect a strictly independent attitude has been maintained. While in no way officially connected with the Department of Botany of the British Museum, the Journal has from the first been controlled by those whose acquaintance with the National Herbarium has enabled them to utilize its pages for recording facts of interest and importance regarding the priceless botanical collections which the Museum contains. Many important monographs and other works first appeared in its pages. In 1896 it became necessary to increase its size, owing to the number of papers sent for publication: the number of plates was at the same time augmented.

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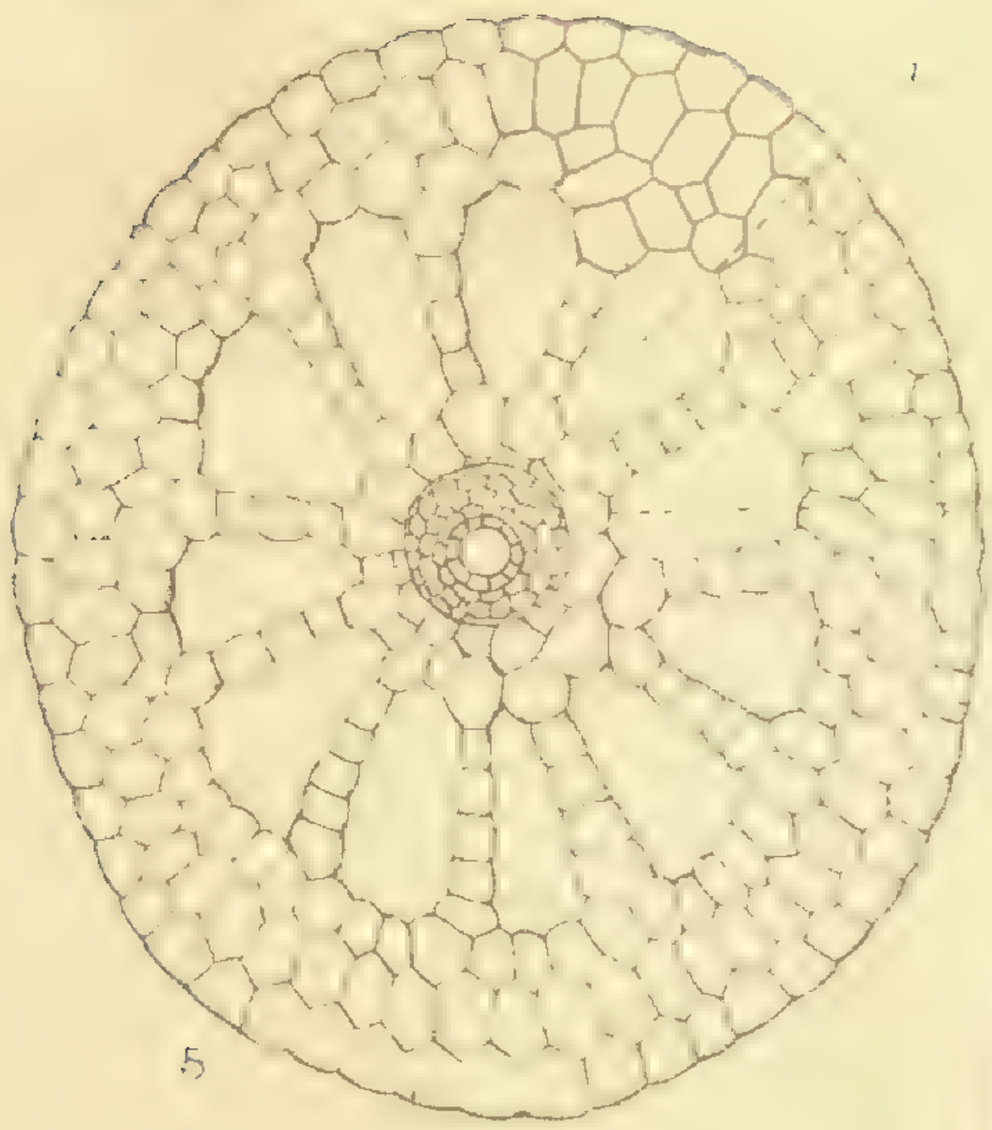

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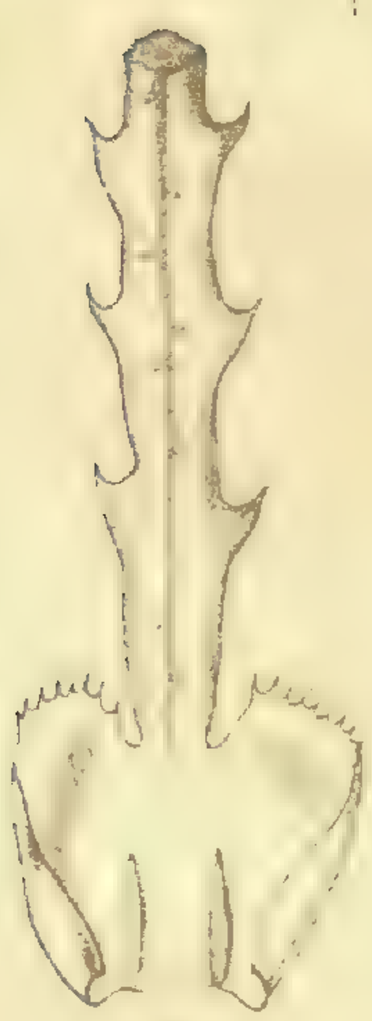

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Najas minor.

THE BRITISH SPECIES OF *NAJAS*.

By A. B. Rendle, M.A., D.Sc.

(Plate 408.)

In the *Journal of Botany* for 1864 Alexander Braun published the first modern systematic account of the genus *Najas*. At that time it was represented in our flora by one species, *N. flexilis*, which had been found by Professor Daniel Oliver in Connemara in 1850. Since 1864, the occurrence of *N. flexilis* in Scotland, the discovery of *N. marina* by Mr. Arthur Bennett in a Norfolk broad, and the establishment of the tropical species *N. graminea* in a Manchester canal have been recorded, and the last two species fully described and figured in this Journal. Mr. Clement Reid's investigations into our recent fossil flora have shown that *N. marina* was formerly more widely distributed in England than at present, and have also quite recently added two new ones to the list of British species—namely, *N. minor* All. and *N. graminea* Delil. As it seems likely that *N. minor* may be growing somewhere in our islands at the present day, a plate has been prepared showing the habit of the plant, and also enlarged figures of its flowers and fruit. These are all drawn from South German specimens; the habit being taken from material preserved in spirit, for which I have to thank Dr. Gluck, of Heidelberg, who gathered it from the Neckar. The fossil seeds of this species and of *N. graminea* are from Mr. Reid's specimens. In the current number of the Linnean Society's *Transactions* (ser. 2, v.) will be found a systematic revision of the genus and its species; it may, however, be of use to give here a short account of the four species which we may now claim as British.

Najas is of world-wide distribution, occurring, except in the frigid zones, in suitable localities in almost every botanical region. It grows completely submerged in fresh or brackish water, generally in ponds, lakes, or rivers. There are thirty-one known species, which fall into two well-marked subgenera—Eunajas, including the single widely-distributed *N. marina*; and Caulinia (separated as a genus by Willdenow), which includes the remaining thirty. The latter can be divided into four sections, three of which are represented by the three remaining British species. The other section is a small one confined to the warmer parts of the Old World, and not known from Europe. Our British species, though few, are therefore highly representative of the genus. They may be at once distinguished by leaf-characters, as will be seen from the following clavis:—

Internodes and backs of leaves spine-bearing .	*N. marina*.
Internodes and backs of leaves smooth.	
Marginal leaf-teeth conspicuous	*N. minor*.
Marginal leaf-teeth inconspicuous.	
Leaf-sheaths sloping	*N. flexilis*.
Leaf-sheaths auricled	*N. graminea*.

The seeds are equally characteristic; thus:—

Seeds polished . . . . . *N. flexilis.*
Seeds rough.
Testa irregularly pitted . . . . . *N. marina.*
Testa regularly pitted.
Pits much broader than long . . . . *N. minor.*
Pits fairly isodiametrical or slightly longer than broad . . . . . *N. graminea.*

Appended is a brief systematic account of our British species, ancient and modern.

Subgenus I. Eunajas.—Dicœcious. Plants of a sturdier habit than in *Caulinia*, with a greater tissue-differentiation of stem and leaf. Leaf-teeth large, back of leaf and internodes spiny. Male flower enclosed in a spathe, anther quadrilocular. Female flower naked, generally with three styles. Testa of more than three hardened cell-layers.

1. N. marina L. Sp. Pl. 1015 (1753); Arthur Bennett in Journ. Bot. 1883, 353, t. 241; Reid, Origin of British Flora, 159 (1899); Rendle in Trans. Linn. Soc. ser. 2, v. 389, t. 39, figs. 1–30 (1899).

N. major Allioni, Fl. Pedem. ii. 221 (1785).

England.—Hickling and Martham Broads, Norfolk. Mr. Reid has found fruits in deposits at the following localities:—Barry Docks, Glamorgan (neolithic); Hitchin, Herts. (interglacial); Beeston, Norfolk, and Pakefield and Corton, Suffolk (preglacial).

The species is widely distributed, being represented by forms or varieties in all the great botanical regions except Tropical and South Africa. The species itself finds its chief development in temperate Europe and Asia, and seems rare elsewhere. It is highly variable, especially in the size of the fruit, in the length and breadth and more or less spiny character of the leaves and internodes. Besides thirteen varieties, three well-marked forms of the species proper can be distinguished. Our specimens, both recent and fossil, seem to belong to one common European form, characterized by sparsely spine-armed internodes, leaves 7–10 lines long, rarely reaching 1 in., with marginal teeth not exceeding the leaf-width in length, and ellipsoidal or ovoid-ellipsoidal fruit 2–2½ lines long by generally a little over 1 line in diameter.

I have seen specimens from France, Germany, Hungary, Italy, Switzerland; and seeds figured by Gunnar Andersson from neolithic deposits in South Sweden and Gothland may belong. It also occurs in India, China, Australia, North America (New York), and Jamaica. Its present more restricted area in Britain is probably due to disappearance of suitable localities.

Subgenus II. Caulinia.—Monœcious. Plants generally more delicate, with a less tissue-differentiation than in *Eunajas;* leaves, except at the midrib, only two cell-layers thick; internodes unarmed; leaf-margin variously toothed, no dorsal spines.

Section 1. *Americanæ.*—Only the male flowers enclosed in a spathe. Leaf-sheaths sloping. Species 8, all except *N. flexilis* confined to America.

2. N. FLEXILIS Rostk. & Schm. Fl. Sedin. 382 (1824); Phytol. iii. 1088 (1850); A. Braun in Journ. Bot. 1864, 276; Sadler, ib. 1875, 297; Morong in Mem. Torr. Bot. Club, iii. pt. 2, 59, t. 66 (1893); Britton & Brown, Ill. Fl. North. U.S. i. 81, fig. 180 (1896); Campbell, A Morphological Study of *Najas* and *Zannichellia*, 1897; Rendle, *l. c.* 403, t. 40, figs. 92–98.

Scotland.—Loch Clunie, Perth.

Ireland.—Connemara; Killarney.

Occurs also in North Germany, Upland, and Finland; and was apparently more prevalent formerly in North-west Europe than at the present day, as it is recorded from recent beds in South-west Norway and Sweden, as well as in East Finland, Hanover, and Holstein. A small-fruited variety (var. *microcarpa* Nilss.) occurs in Lake Ringsjön, South Sweden. The species is generally distributed in Canada and the Northern United States. It is readily distinguished by the minute marginal leaf-teeth, sloping sheath, and polished seed.

Section 2. *Euvaginatæ*.—Only the male flowers enclosed in a spathe. Sheaths truncate or more or less auricled. Species 16, chiefly tropical Old World.

3. N. MINOR Allioni, Fl. Pedem. ii. 221 (1785); A. Br. in Journ. Bot. 1864, 277; Nees, Gen. Pl. Fl. Germ. iii. t. 44, figs. 22–24; Peterm. Deutsch. Fl. 539, t. 83, fig. 658; Schkuhr, Bot. Handb. iii. 252, t. 296; Reid, Origin of British Flora, 160; Rendle, *l. c.* 410, t. 41, figs. 105–115. (Pl. 408, figs. 1–9.)

Small much-branched plants from a few inches to about a foot in length. Habit varying according to the length of the internodes. The small plants have a densely leaved bushy habit, with a rounded outline from the regular apparently dichotomous branching. A laxer habit results from elongation of the lower internodes, and the bushy growth is confined to the ends of the longer shoots.

Leaves stiff, succulent, linear-tapering, falcately recurved from the broad truncately rounded sheath; the margin bears a few (6–10) spreading teeth with a broad base ending in an upcurved yellow-brown spine-cell. *Sheaths* with a few, generally 5–7, rather prominent teeth on each shoulder; intravaginal scales linear-subulate, $\frac{3}{8}$ to nearly $\frac{1}{2}$ line long. *Blade* generally from about $\frac{1}{2}$ to $\frac{3}{4}$ in. in length by $\frac{1}{4}$ line or less in width, excluding the teeth, the length of which varies from about one-third the leaf-width in the lower part of the blade to three-fourths the leaf-width in the upper.

Male flowers about $\frac{3}{4}$ line long before elongation of the stalk; spathe ellipsoidal, with a short neck bearing a few spines round the mouth; perianth closely investing the almost sessile anther, above which it terminates in a pair of thick closed lips. Anther ellipsoidal, unilocular, pollen-grains rounded or subelliptical. Before dehiscence the stalk elongates and pushes the flower through the neck of the spathe, which splits lengthwise; the lips of the perianth then separate, allowing the pollen from the burst anther to escape; length of dehiscing flower 1 line.

Female flower about $1\frac{1}{4}$ line long, of which the sessile ovary occupies about one-third; style long, tapering upwards, and ending in two unequal stigmas.

Fruit obliquely linear-oblong, narrowing at the tip; 1–1½ lines long, about ¼ line in diameter; pericarp thin, closely enveloping the seed. *Seed* hard, brown, marked with 12–18 longitudinal rows of ladder-like pits; raphe conspicuous in the lower half of the seed, causing a slight asymmetry.

The species is readily distinguished from all others by the transversely elongated markings on the testa, which are more than twice as broad as long.

The internal structure of the stem (*cf.* fig. 5) closely resembles that of *N. graminea*, already figured by Mr. Bailey in this Journal (1884, 308, t. 42). The epidermis consists of cells which scarcely differ from those of the underlying thin-walled cortex. About half the width of the cortex consists of large intercellular spaces bounded by bands of parenchyma one cell thick, and separated from the epidermis by generally two layers of similar cells, and on the inside by one to two layers from the stele, a central axis of much smaller cells surrounding a median air-space. The central space probably represents the position of woody tissue which has never developed. Professor Campbell has shown that in *N. flexilis*, which has a similar stem-structure, the axis in the very young stem is occupied by narrow elongated tracheides, which, however, soon perish as the stem lengthens, leaving the air-space characteristic of the adult stem. The three to four layers of narrow irregularly shaped thin-walled cells surrounding the space show no traces of differentiation.

The stem-structure is typical of the subgenus *Caulinia*, and affords a well-marked contrast with that of *N. marina*, where the epidermis is a layer well differentiated from the cortex, and the latter a much more substantial structure, of which the intercellular spaces occupy a much smaller proportion. Nor does it seem possible in *N. minor* to make out an endodermal structure in the cells of the layer surrounding the stele, as can be done in *N. marina*.

Similarly the leaf is a simpler structure than in *N. marina*, consisting of two layers of cells separated by a large intercellular space on each side the midrib at which an additional layer surrounds a narrow small-celled axis.

England.—Seeds found in pleistocene beds at West Wittering, Sussex (*Reid*); and Cromer forest-bed (preglacial) at Pakefield, Suffolk (*Reid*).

Generally distributed over the southern half of the continent of Europe from France to South Russia, and in Asia from Asia Minor to further India; I have also seen a fragment from Manchuria.

The preglacial deposit at Pakefield in which *N. minor* is associated with *N. marina* yielded about fifty species of flowering plants (Reid, *l. c.* 85), all of which, except the South European *Trapa natans*, are members of our present day flora. In the pleistocene deposit *N. minor* and *graminea* occur together. Mr. Reid gives a list of ninety-four species, all of which, except the two of *Najas*, are still found in Britain; but he also found "several well-marked forms, which do not belong to any living British plants, but cannot yet be identified." "The plant-bed contains remains of

elephant, rhinoceros, with some freshwater shells no longer living in Britain."

Section 3. *Nudæ*.—Both the male and female flowers without a spathe. Sheaths markedly auricled. A single species generally distributed throughout the warmer parts of the Old World.

4. N. GRAMINEA Delile in Descr. Égypt. Hist. Nat. ii. 282, t. 50, fig. 3 (1813); A. Br. in Journ. Bot. 1864, 278; C. Bailey, ib. 1884, t. 250; Rendle, *l. c.* 424, t. 42, figs. 192–201. (Pl. 408, figs. 10, 11.)

Var. *Delilei* Magnus in Ber. Deutsch. Bot. Ges. i. 522 (1883); C. Bailey, *l. c.* 305, t. 249.

England.—Reddish Canal, near Manchester (introduced). Seeds in pleistocene beds at West Wittering, Sussex (*Reid*).

Common in the warmer parts of the Old World, from Egypt and East Tropical Africa through Arabia to India, Malaya, and North Australia; also found in Hongkong and Japan. It has been known in North Italy for nearly one hundred years, and is supposed from its occurrence in the rice beds to have been introduced with rice-seed.

Magnus found that the leaves of the Manchester specimens and also of some from Egypt and Syria did not have the row of thickened supporting cells (libriform cells) beneath the marginal epidermis, which is generally found in the species. He therefore separated them as var. *Delilei*, which, however, I have ventured to disregard, as the specimens conform to the type in every other character.

In conclusion, it may be of interest to note that these four species are not only representative of the different types of the genus to which they belong, but also of some of the different elements of our flora. *N. marina* is obviously a member of the cold temperate continental European group, *N. minor* represents a somewhat more southern European set, and *N. graminea* a sub-tropical one, which at the present day is not endemic north of the Mediterranean basin. *N. flexilis* recalls a relation between the floras of North-west Europe and cold temperate North America which is also suggested by *Eriocaulon septangulare* and *Sisyrinchium angustifolium*.

EXPLANATION OF PLATE 408.

FIGS. 1–9. *Najas minor* Allioni:—1. Portion of plant, nat. size. 2. Single leaf, side view, × 4. 3. Lower portion of leaf, front view, × 4, showing intravaginal scales. 4. Single tooth of leaf-margin, × 8. 5. Transverse section of stem, × 30; *e*, epidermis; *s*, central stele; between *e* and *s* is the cortex including a regular ring of intercellular spaces, *i*. 6. Male flower, × 30; *s*, spathe; *pe*, pedicel; *p*, perianth; *a*, anther. 7. Female flower, after fertilization, × 12. 8. Seed, from a specimen collected near Strassburg, × 12. 9. Fossil seed found by Mr. Reid at West Wittering, Sussex (pleistocene), × 12.

FIGS. 10, 11. *N. graminea* Delile:—10. Seed, × 12. 11. Fossil seed from the pleistocene of West Wittering (*Reid*), × 12.

THE EUROPEAN SPHAGNACEÆ
(AFTER WARNSTORF).

By E. Charles Horrell, F.L.S.

The system of Sphagnology which has resulted from the researches of Dr. Warnstorf for more than thirty years seems to be but little known in this country, and it is with the object of placing before British bryologists what is perhaps the most natural classification of bog-mosses that has yet appeared that the present paper is written. This system is now generally adopted by continental and American bryologists, and differs widely from that in use in this country, as may be seen from the fact that Warnstorf recognizes forty-two European species in his most recent publication, that of which a translation is given below, as compared to the twelve species with three subspecies in Dixon & Jameson's *Handbook of British Mosses* (1896). The following list comprises most of the publications of Warnstorf and those other students to whose labours the present state of knowledge of the European members of the genus is due, commencing at 1880 with the publication of Dr. Braithwaite's splendid monograph.

1880. R. Braithwaite. The Sphagnaceæ or Peat-mosses of Europe and North America.
1881. C. Warnstorf. Die europäischen Torfmoose. Eine Kritik und Beschreibung derselben. A French translation of this work appeared in the Revue de Botanique, t. vi. 1887–88, by Letacq.
1881–1882. G. Limpricht. Zur Systematik der Torfmoose (Bot. Centralbl. 1881 and 1882).
1882. S. O. Lindberg. Europas och Nord Amerikas Hvitmossor (Sphagna).
,, K. Schliephacke. Die Torfmoose der Thüringischen Flora (Irmischia ii. 1882).
,, C. Warnstorf. Die Torfmoose in Königlichen botanischen Museum zu Berlin (Bot. Centralbl. 1882, pp. 96 et seqq.).
,, C. Warnstorf. Neue deutsche Sphagnumformen (Flora, 1882, p. 205).
,, C. Warnstorf. Einige neue Sphagnumformen (Flora, 1882, p. 464).
,, C. Warnstorf. Die Sphagnumformen der Umgegend von Bassum in Hannover (Flora, 1882, No. 35).
1883. C. Warnstorf. Die Torfmoose des v. Flotow'chen Herbarium im Königl. bot. Museum in Berlin (Flora, 1883, p. 371).
,, C. Jensen. Varietates novæ Sphagnorum (Pflanzenkatalog der bot. Ges. zu Kopenhagen).
1884. C. Warnstorf. Neue europäische Sphagnumformen (Hedwigia, 1884, Nos. 7 & 8).
,, C. Warnstorf. Sphagnologische Rückblicke (Flora, 1884, pp. 469 et seqq.).

1884. J. Cardot. Notes Sphagnologiques. Descriptions de quelques variétés nouvelles (Revue Bryol. 1884, No. 4).
1885–86. G. Limpricht. Die Laubmoose (in Rabenhorst's Kryptogamen-Flora von Deutschland etc., Livr. 2 & 3).
1886. J. Cardot. Les Sphaignes d'Europe. Revision critique des espèces et étude de leurs variations (Bull. de la Soc. royale de Bot. de Belg. t. xxv. 1re partie).
,, C. Warnstorf. Zwei Artentypen der Sphagna aus der Acutifolium-gruppe (Hedwigia, 1886, p. 221).
1887. E. Russow. Ueber den gegenwärtigen Stand seiner seit dem Frühling 1886 wieder aufgenommenen Studien an den einheimischen Torfmoosen (Sitzungsb. d. Dorpater Naturf.-Ges. 1887, p. 305).
,, E. Russow. Zur Anatomie resp. physiologischen & vergleichenden Anatomie der Torfmoose (Schriften herausgegeben von d. Naturf.-Ges. d. Univ. Dorpat iii.).
,, J. Cardot. Revision des Sphaignes de l'Amérique du nord (Bull. de la Soc. royale de Bot. de Belg. t. xxvi. 1re partie).
1888. C. Warnstorf. Die Acutifolium-gruppe der europäischen Torfmoose (Abhandl. d. Bot. Ver. d. Prov. Brandenburg, xxx. p. 79).
,, C. Warnstorf. Revision der Sphagna in der Bryotheca Europæa von Rabenhorst und in einigen älteren Sammlungen (Hedwigia, 1888, p. 266).
,, J. Röll. "Artentypen" und "Formenreihen" bei den Torfmoosen (Bot. Centralbl. 1888, Nos. 23–26).
,, E. Russow. Ueber den Begriff "Art" bei den Torfmoosen (Sitzungsb. d. Dorpater Naturf.-Ges. 1888, p. 413). This article has been translated into French by Gravet in the Revue Bryol. 1891, No. 5 ("Sur l'idée d'espèce dans les Sphaignes").
1889. C. Warnstorf. Sphagnum crassicladum Warnst. Ein neues Torfmoos für Europa aus der Subsecundumgruppe (Bot. Centralbl. 1889, xl. p. 165).
,, E. Russow. Sphagnologische Studien (Sitzungsb. der Dorpater Naturf.-Ges. 1889, p. 94).
1890. C. Warnstorf. Sphagnum degenerans var. immersum. Ein neues europäisches Torfmoos (Bot. Centralbl. 1890, p. 102).
,, C. Warnstorf. Die Cuspidatumgruppe der europäischen Sphagna (Abhandl. d. Bot. Ver. d. Prov. Brandenburg, xxxii. p. 173).
,, C. Warnstorf. Contributions to the Knowledge of the North American Sphagna (Bot. Gazette, xv. p. 127).
,, C. Jensen. De danske Sphagnum-Arten (Bot. Forenings Festskrift. 1890).
1890–91. C. Warnstorf. Beiträge zur Kenntniss exotischer Sphagna (Hedwigia, 1890, Nos. 4 & 5; 1891, Nos. 1 & 3).
1891. Venturi. Les Sphaignes européennes d'après Warnstorf et Russow (Revue Bryol. 1891, Nos. 2, 4, 5, & 6). This is a French translation of the above article in the Botanical Gazette (1890).

1892. C. Warnstorf. Einige neue exotische Sphagna (Hedwigia 1892, No. 4).
1893. C. Warnstorf. Beiträge zur Kenntniss exotischer Sphagna (Hedwigia, 1893, No. 1).
„ C. Warnstorf. Characteristik und Uebersicht der europäischen Torfmoose nach dem heutigen Standpunkte der Sphagnologie (1893) (Schrift. d. naturw. Vereins d. Harzes in Wernigerode, viii. 1893).
1894. E. Russow. Zur Kenntniss der Subsecundum- und Cymbifolium-gruppe europäischer Torfmoose (Archiv für die Naturk. Liv.- Est.- und Kurlands. Zweite Serie, Bd. x. Lfg. 4, pp. 361–527).
„ C. Warnstorf. Characteristik und Uebersicht der nord-, mittel-, und sudamerikanischen Torfmoose nach dem heutigen Standpunkte der Sphagnologie (1893) (Hedwigia, 1894, p. 307).
1896. C. Warnstorf. Die Moos-vegetation der Tucheler Heide, mit besonderer Berücksichtigung der Moose (Schriften d. Naturf. Ges. in Danzig. N. F., Bd. ix. heft 2, 1896).
1897. J. Cardot- Répertoire Sphagnologique (Bull. de la Soc. d'Histoire Naturelle d'Autun, x.).
1898. C. Warnstorf. Beiträge exotischer und europäischer Torfmoose (Bot. Centralbl. lxxvi. p. 385 & 417).
1899. C. Warnstorf. Neue Beiträge zur Kryptogamenflora der Mark Brandenburg (Verhandl. d. Bot. Vereins d. Provinz Brandenburg, xli.).

Very numerous varieties and forms have also been published in the two Sphagnum Exsiccata issued by Warnstorf. The first of these, under the title of "Sphagnotheca Europæa," contained two hundred numbers, and was issued in four fascicles of fifty; and the second, "Sammlungen Europäischen Torfmoose," containing four hundred numbers, was issued in four series in the years 1888, 1890, 1892, and 1894 respectively.

The main difference between Warnstorf's system and that in general use in this country is due to the great importance ascribed in the former (1) to the position and form of the chlorophyllose cells as seen in transections of the branch leaves; and (2) to the form and distribution of the *pores* on the walls of the hyaline cells of the branch leaves and, to a less extent, of the stem leaves. To make out the former point, it is absolutely necessary to make transverse sections of the leaves. To do this it has been suggested that the branches should be embedded in a thick gum solution, which is then allowed to dry; the sections are then cut with a razor, and on being placed in water the gum dissolves, and the sections can be examined. This, however, is a somewhat lengthy process, and perfectly thin sections can be prepared with very little trouble by placing several branches together between the two split halves of a piece of elder-pith, and then cutting across the whole. Care must be taken to select only the spreading branches, and the most highly developed leaves from the middle and lower portion of

the branches must be cut. The razor must of course be kept exceedingly sharp, and whilst the sections are being cut the whole blade should be kept well moistened with spirit. The sections should then be examined in water.

To correctly make out the pore structure, it is necessary to *stain* the leaves. For this purpose a saturated aqueous solution of methyl-violet gives the best results, and need only be allowed to act for a minute or two. With this dye the entire cell-wall stains a deep violet in a very short time, and the pores show up as colourless areas against the dark background; and those places where the wall is not completely perforated, but where only a "membrane thinning" is formed, appear as lighter stained areas. Fuchsine, methyl-green, and saffranine, &c., also give satisfactory results; while, if permanent preparations be desired, hæmatoxylin should be used, and the leaves in that case should be mounted in Canada balsam.

Russow describes four types of pores as follows:—(1) *Non-bordered* perforations with thin and delicate outlines, and which can only be clearly seen in stained preparations. These are especially found in the stem leaves of certain species, rarely in branch leaves. (2) *Bordered pores*, in which the opening is surrounded by a distinct thickened ring, which may be of greater or lesser thickness. This is the most usual form of pore found in the bog-mosses. (3) *Hof-poren*, in which, within the thickened ring, is a wider or narrower band of the unthickened cell-membrane, so that the actual perforation is relatively very small, and is, as it were, surrounded by a courtyard (Hof). Sometimes there are two perforations within the same ring. (4) *Pseudo-pores*. These are round or oval rings of thickening, which are very commonly found in some leaves, especially in the Subsecundum group, and which in unstained preparations closely resemble true bordered pores. On staining it will, however, be found that the cell-membrane within the ring is quite intact, and that there is no pore present. As these pseudo-pores commonly occur against the commissures of the hyaline cells, in the same position as usually do the true pores, there is danger, if a stain is not used, of thinking the pores much more numerous than they really are.

The structure and distribution of the pores frequently differ greatly on the two surfaces of the same leaf, and, as will be seen in the following clavis, it is often essential to clearly make out these points. This is in almost every case easy, as, owing to the concavity of the leaf, and the very common incurving of the margin near the apex, there is no difficulty in determining which is the inner and which the outer surface, and consequently in the following clavis and descriptions of species I have uniformly called the morphologically upper surface of the leaf the *inner*, and the lower surface the *outer*. It must also be understood that, unless otherwise specified, by *branch leaf* is meant one of the most highly developed leaves from the middle or lower portion of a sterile spreading branch.

Following the descriptions of species I have endeavoured to indicate the main varieties that Warnstorf recognizes, but have not

attempted to give descriptions of the innumerable varieties which in the past have been named. Without the examination of original specimens this would in the case of most species be worse than useless, as it is not possible from the descriptions of the varieties to tell to which of the segregates many belong.

With the description of each species I have endeavoured to give the synonymy only so far as this is necessary to bring into line the names in Dixon's *Handbook* and Braithwaite's *Monograph* with those here used. A full synonymy will be found in Cardot's *Répertoire Sphagnologique* (1897). With the intention of removing the confusion that has arisen from the description of the numerous analogous varieties of different species under different names, Russow has suggested that the same terms should be used in each species for the corresponding forms, and that names of Greek derivation should be employed. The chief of these are—*orthocladum* instead of *strictum*, when the branches are erect; *anocladum* when the branches curve outwards; *catocladum* instead of *deflexum*; *dasycladum* for *compactum*; *eurycladum* instead of *laxum*; *mastigocladum* for *flagellatum*, *brachycladum*, *macrocladum*, *microcladum* (branches of medium length); *homalocladum* (with straight branches); *drepanocladum* (with sickle-shaped branches); *leptocladum* (with thin branches); *pachycladum* (with thick branches), &c., and various combinations of these terms. For the sake of brevity these terms will be employed in the following descriptions of species.

Clavis to the European Species of Sphagnum

(after Warnstorf (1899)).

1. Cortical cells of stem and brauches without spiral fibrils; br. l. always truncate and toothed at the apex 2

1. Cortical cells of stem and branches with spiral fibrils; br. l. at the apex cucullate, not truncate and toothed, but with narrow hyaline border 23

2. Chlor. cells of br. l. in section triangular to trapezoid, inserted between the hyaline cells on the inner surface of the leaf, and free either only on the inner or on both surfaces; hyaline cells more strongly convex on the outer surface; not papillose 3

2. Chlor. cells of br. l. in section triangular to trapezoid, inserted between the hyaline cells on the outer surface of the leaf, and free either only on the outer or on both surfaces; hyaline cells more strongly convex on the inner surface; inner wall of the hyaline cells where they are united to the chlor. cells with or without papillæ . . . 10

2. Chlor. cells of br. l. in section elliptical, barrel-shaped to rectangular, median or in *S. compactum* nearer the outer surface; either enclosed by the hyaline cells on both surfaces or free on both; inner wall of the hyaline cells where they are united to the chlor. cells generally without, more rarely with, papillæ 15

§ 1. *Sphagna acutifolia* Schimp. Spp. 1–11.

3. Most of the superficial cortical cells of the stem with a single large non-bordered pore; inner surface of the entire upper half of the br. l. with large round pores which are sometimes opposite the pores on the outer surface; st. l. usually without fibrils 4

3. Superficial cortical cells of the stem rarely with scattered pores; inner surface of the br. l., especially near the lateral margins in the middle and lower parts of the leaf, with large round non-bordered pores; st. l. with or without fibrils 5

4. St. l. more or less widened towards the summit, spatulate; on the wide rounded apex and for some distance down the lateral margins, fimbriate by reabsorption of the cell-walls. Wood-cylinder of stem and branches never red.
i. *S. fimbriatum* Wils.

4. St. l. not widened above, lingulate, fimbriate only, with very few exceptions, on the wide rounded apex; membrane of the hyaline cells in the upper part of the leaves always re-absorbed. Wood-cylinder of stem and branches never red.
ii. *S. Girgensohnii* Russ.

4. St. l. lingulate, only in the middle of the wide rounded apex slightly fimbriate; walls of the hyaline cells in upper part of the leaves never re-absorbed; frequently without fibrils, but often fibrillose in upper part of the leaf. Wood-cylinder of stem and branches frequently (♂ branches always) red.
iii. *S. Russowii* Warnst.

5. St. l. more or less lingulate, without fibrils (in *S. rubellum* usually fibrillose in upper half). Margin of br. l. not dentate 6

5. St. l. from a wider base more or less narrowed above, hence triangular to triangular-lingulate, with or without fibrils. Margin of br. l. not dentate 7

5. St. l. from a narrower base widened upward to the middle and thence produced to a broadly truncate, toothed apex; border narrow and of equal width from apex to base; with or without fibrils. Br. l. with the upper margins minutely dentate. Wood-cylinder always pale or yellowish. Tufts usually pale- or greyish-green . . . xi. *S. molle* Sulliv.

6. Br. l. when dry (especially in the capitulum) curved, erecto-patent, those of the basal half of the spreading branches, on the outer surface towards the apex with very small, round, strongly-ringed pores; st. l. always non-fibrillose. Wood-cylinder of the stem never brown. Tufts green, reddish to dark purple . . . . iv. *S. Warnstorfii* Russ.

6. Br. l. of the spreading branches usually when dry (especially in the upper branches) more or less secund and with a broad rounded-truncate, almost cucullate apex; on the outer surface in the apical part with large semi-elliptical,

weakly-ringed pores; st. l. not rarely with fibrils in the upper part. Wood-cylinder of the stem never brown. Tufts green, yellowish, rose-red, but never brown.
v. *S. rubellum* Wils.

6. Br. l. of the spreading branches when dry imbricate and with rounded-truncate apex; on the outer surface in the apical part with small strongly-ringed pores; st. l. almost always non-fibrillose. Wood-cylinder of stem always red-brown. Tufts usually a characteristic uniform brown, more rarely in the upper part pale brown or green.
vi. *S. fuscum* Klinggr.

7. Br. l. when dry entirely without lustre, usually closely imbricate; st. l. usually with numerous fibrils, more rarely non-fibrillose; superficial layer of stem cortex usually without pores; wood-cylinder generally red . . 8

7. Br. l. when dry with a distinct metallic lustre, imbricate or curved erecto-patent to squarrose; st. l. with or without fibrils; superficial layer of stem cortex with or without pores; wood-cylinder of stem greenish, yellowish or red to dark purple 9

8. St. l. in the completely developed plant with a short truncate and toothed only slightly elongated apex, with a narrower or wider margin, which is always widened below.
vii. *S. acutifolium* Russ. & Warnst.

8. St. l. large, generally with undulate margins, prolonged above into a somewhat long, truncate and toothed apex with incurved margins, as in *S. subnitens*. Border to near the leaf-base narrow and then suddenly distinctly widened; hyaline cells generally with numerous fibrils as far as the leaf-base. (Plants more robust than the strongest forms of *S. acutifolium*.) viii. *S. tenerum* Warnst.

9. Br. l. when dry (especially in the capitulum) almost always distinctly in five rows and curved erecto-patent, as in *S. Warnstorfii;* st. l. from a broad base distinctly isosceles-triangular, with or without fibrils; cortical cells of stem with scattered pores; wood-cylinder not red, but green or yellowish . . . . ix. *S. quinquefarium* Warnst.

9. Br. l. when dry imbricate, rarely erecto-patent to squarrose; st. l. large, with undulate margin and elongated broadly truncate apex, usually non-fibrillose, rarely with fibrils; hyaline cells several times divided by cross walls; wood-cylinder usually dark purple . x. *S. subnitens* Russ. & Warnst.

10. Stem cortex from the usually reddish or red wood-cylinder always clearly differentiated, with its cell-walls not or but little thickened. St. l. large, lingulate, fimbriate on the broad rounded apex, with narrow border reaching to the base and remaining of equal width throughout; membrane of the hyaline cells in the upper part reabsorbed on both sides of the leaf and non-fibrillose; br. l. usually with the

upper half squarrose-spreading, when dry never undulate, the hyaline cells on both sides with numerous large pores and not rarely having minute papillæ on the inner wall which is in contact with the chlorophyllose cells . . . 11

10. Stem cortex from the pale, yellowish, rarely reddish wood-cylinder usually not clearly differentiated, with its cell-walls much thickened. St. l. sometimes small, sometimes of medium size to large, triangular, lingulate to spatulate, border generally much widened towards the base; hyaline cells with or without fibrils; br. l. when dry usually undulate or crisped; position of pores very various; the hyaline cells always without papillæ . . 12

§ II. *Sphagna squarrosa* Schimp. p. p. Spp. 12, 13.

11. Plants at times almost as robust as *S. cymbifolium;* br. l. usually in the upper half squarrose-spreading, rarely erecto-patent or imbricate. Monoicous; ♂ branches at first short, clavate, later the whole antheridium-bearing part becomes equally elongated; leaves of the ♂ branches smaller than those of the sterile branches, curved erecto-patent, in the middle part of the basal half non-fibrillose.
xii. *S. squarrosum* Pers.

11. Plants about of the robustness and habit of *S. Girgensohnii;* br. l. usually imbricate or some of them erecto-patent, rarely with the upper half squarrose. Dioicous; ♂ branches at first short, clavate, later the apex alone becomes elongated and flagelliform, the thicker antheridium-bearing part remaining unaltered; leaves of the ♂ branches differing but little in size and form from those of the sterile branches, but having the fibrils in the hyaline cells towards the base of the leaf very delicate and more or less incompletely developed . xiii. *S. teres* Angstr.

§ III. *Sphagna cuspidata* Schimp. Spp. 14–21.

12. Br. l. lanceolate, shortly or longly acuminate, dentate at the narrowly- or widely-truncate apex (rarely also on the lateral margins); the margins near the apex, or for some distance down, involute; when dry not rarely more or less undulate 13

12. Br. l. small ovate or oblong-ovate; apex very short, narrowly truncate, with small teeth; entire margin involute; when dry never undulate or crisped.
xxi. *S. molluscum* Bruch.

13. St. l. broader above, spatulate, strongly fimbriate on the broad rounded apex; non-fibrillose . xiv. *S. Lindbergii* Schimp.

13. St. l. triangular-lingulate, at the apex fimbriate and two-cleft; always non-fibrillose . . . xv. *S. riparium* Angstr.

13. St. l. triangular to triangular-lingulate, at the apex never fimbriate and two-cleft; with or without fibres . . . 14

14. St. l. large, isosceles-triangular, in the upper part almost always with fibrils; border of br. l. 4–15 cells wide;

pores on the outer surface of br. l. very small, and almost exclusively in the upper angles of the cells; on the inner surface wanting, or in the angles of the cells of the apical half of the leaf only, rarely almost to the leaf-base; chlor. cells in section rectangular-trapezoid, free on both surfaces; stem cortex generally clearly differentiated from the wood-cylinder . xvi. *S. cuspidatum* Russ. & Warnst.

14. St. l. large, triangular-lingulate, towards the apex usually with fibrils; border of br. l. up to six cells wide; pores on the outer surface of br. l. very numerous; in the apical half of the leaf, in a single row in the centre of the cell-wall, and here at times becoming converted into large membrane-gaps; in the lower part of the leaf generally in two rows near the commissures, either with a weak ring or non-bordered, but with a sharp contour, 6–7 μ in diameter; chlor. cells and stem cortex as in *S. cuspidatum*, which it approaches most nearly in habit.

xvii. *S. Dusenii* Russ. & Warnst.

14. St. l. large, triangular-lingulate, towards the apex usually with rudimentary, or in part completely developed, fibrils; border of br. l. narrow, 3–4 cells wide; pores on the outer surface of br. l. very numerous, small, generally in two rows near the commissures or in the middle of the cell-wall; towards the leaf-apex strongly ringed and resembling strings of pearls, at times interrupted by pseudo-pores; chlor. cells in section triangular, on the leaf inner surface completely enclosed by the hyaline cells which are united together for some distance; stem cortex not clearly differentiated from the yellowish wood-cylinder, and thus apparently absent . . . . xviii. *S. annulatum* Lindb. fil.

14. St. l. rather large, triangular-lingulate; always without fibrils; on the outer surface of the br. l. with extremely small, about 2 μ in diameter, ill-defined pores which only become visible by intense staining of the cell-wall. These pores are sometimes found only in the basal part of the leaf, and especially towards the margins, sometimes (but rarely) they are in two rows on the cell-walls throughout the entire outer surface; on the inner surface of the br. l. pores are usually entirely absent; very rarely both leaf-surfaces are almost without any pores. Chlor. cells in section as in *S. annulatum* . . . xix. *S. obtusum* Warnst.

14. St. l. almost always small, equilateral-triangular to short-isosceles-triangular or triangular-lingulate to oval, acuminate or with obtuse apex, mostly without fibrils; border of br. l. 2–4 cells wide; pores on the outer surface of br. l. in the middle and basal part of the leaf, large, and situated in the upper angles of the cells near the margins of the leaf; or there are here several pores on the surface of each cell. The pores on the outer surface in the upper angles of the cells are generally placed immediately over

corresponding pores on the inner surface; pores on the outer surface towards the apex sometimes very small and ringed, arranged in short, often interrupted rows on the commissures; pores on the inner surface generally very numerous, in nearly every cell-angle over the wide leaf-surface; chlor. cells in section triangular and completely enclosed on the inner surface; stem cortex usually not clearly differentiated from the wood-cylinder, and hence apparently absent . . xx. *S. recurvum* Russ. & Warnst.

§ iv. *Sphagna polyclada* Russ. Sp. 22.

15. Branches 7–13 in a fascicle; chlor. cells median, in the upper half of the leaf, in section elliptical and enclosed by the hyaline cells on both sides, in the basal part of the leaf barrel-shaped to rectangular and free on both surfaces; inner wall of the hyaline cells, where united to the chlor. cells, with minute papillæ; wood-cylinder dark blood-red, st. l. small, triangular-lingulate, without fibrils. xxii. *S. Wulfianum* Girgens.

§ v. *Sphagna rigida* Schimp. Sp. 23.

15. Branches 3–4 in a fascicle; chlor. cells in section not median, but nearer the outer surface, elliptical and enclosed on both surfaces by the hyaline cells which are united together for some distance; inner wall of hyaline cells (in European species) always without papillæ; wood-cylinder dark brown; st. l. small, triangular-lingulate, without fibrils. xxiii. *S. compactum* DC.

§ vi. *Sphagna truncata* Warnst. Sp. 24.

15. Branches 3–5 in a fascicle; chlor. cells in section median, barrel-shaped to almost rectangular, and on both sides of the leaf with their strongly thickened outer walls free; inner wall of the hyaline cells always without papillæ; wood-cylinder pale or yellowish; st. l. large, lingulate, fimbriate on the broad truncate apex, border much wider below, usually without fibrils, in form and structure much like those of *S. Girgensohnii;* br. l. at the apex broadly truncate and toothed . . . xxiv. *S. Angstroemii* Hartm.

15. Branches generally 3–5 in a fascicle, rarely single or wanting; chlor. cells in section median, barrel-shaped or rectangular to quadrate, free on both surfaces of the leaf; inner wall of hyaline cells always without papillæ; st. l. either triangular-lingulate and with the border but little wider below or of median size to very large, lingulate and with a narrow border of equal width throughout; at the apex generally truncate and toothed, rarely somewhat fimbriate, generally in very varying degree fibrillose, more rarely quite without fibrils; at times the st. l. and br. l. similar in form and cell-structure; br. l. often secund 16

§ VII. *Sphagna subsecunda* Schimp. Spp. 25–35.

16. Branches of the completely developed plant 3–5 in a fascicle; br. l. always with pores 17

16. Branches single or wanting; br. and st. leaves entirely without pores . . . . . XXXV. *S. Pylaiei* Brid.

17. Stem cortex always two or more layered 18

17. Stem cortex always one-layered, rarely on one side of the circumference two-layered 19

18. St. l. small, triangular-lingulate, only fibrillose near the apex of the leaf; br. l. small to medium size, lanceolate, with narrow truncate elongated apex, secund, when dry with a slight lustre; habit of *S. subsecundum.*
XXV. *S. contortum* Limpr. (= *S. laricinum* Spruce).

18. St. l. large, lingulate, generally with numerous fibrils to the base; br. l. large, roundish-ovate, with broad truncate, not elongated, small-toothed apex, not secund but loosely imbricate . . . . XXVI. *S. platyphyllum* Warnst.

19. Br. l. on the outer surface with numerous pores, which are almost always in rows on the commissures like strings of pearls, on the inner surface almost without pores or with very few 20

19. Br. l. with numerous pores on both sides, which are either on the outer side in rows and on the inner side in almost every cell-angle, or are in rows on both sides 21

19. Br. l. on the inner side with numerous pores which are often arranged in rows, on the outer side almost with pseudopores only, which are mixed with scattered small true pores 22

19. Br. l. on both sides with very few pores or almost entirely without; in the latter case with the hyaline cells more or less replaced by chlorophyllose cells of similar form; st. l. large, lingulate, usually fibrillose to the base, and with few pores as in the br. l. . . . XXXIV. *S. obesum* Warnst

20. St. l. very small, less than 1 mm. long, triangular-lingulate, almost always non-fibrillose, rarely with rudimentary fibrils towards the apex; hyaline cells undivided, on the inner surface in the upper third of the leaf with somewhat large non-ringed or weakly ringed pores, on the outer surface with single or numerous smaller ringed pores in the cell-angles . . . . . XXVII. *S. subsecundum* Limpr.

20. St. l. larger, 1 mm. or more long, lingulate, always with fibrils in the upper half, rarely fibrillose lower; hyaline cells generally divided, on the inner surface with numerous round, weakly or strongly ringed pores or also towards the base non-ringed pores, on the outer surface with few or more numerous ringed pores in the cell-angles. Plant somewhat more robust than *S. subsecundum.*
XXVIII. *S. inundatum* Warnst.

20. St. l. very large, from a narrower base widely lingulate, toothed at the broadly truncate apex, border narrow and of equal width throughout ; hyaline cells fibrillose to the base, on the inner surface almost without pores or only with scattered pores near the leaf margins, on the outer surface in rows like strings of pearls at the commissures. Plant much more robust than *S. subsecundum* and *S. inundatum* . . . . . xxix. *S. Gravetii* Warnst.

21. St. l. large, lingulate, always fibrillose in the upper half, rarely almost to the base ; hyaline cells usually septate, either only on the outer surface with numerous strongly ringed pores arranged in rows (sometimes towards the leaf apex also with a row in the middle of the cell-wall), and on the inner surface with fewer weakly ringed, towards the base non-ringed, pores, or on both sides with very numerous pores. Plants very robust, with the habit of *S. Gravetii* . . . . . xxx. *S. rufescens* Warnst.

21. St. l. large, 1·86–2 mm. long, lingulate, fibrillose to the base, some of the hyaline cells septate, on the inner surface with numerous small ringed pores, generally in rows at the commissures, on the outer surface, on the contrary, with very few pores ; otherwise resembling *S. rufescens* . . . . . xxxi. *S. aquatile* Warnst.

22. St. l. large, lingulate, usually fibrillose to the base, only some of the hyaline cells septate, on the inner surface with numerous ringed pores in rows at the commissures, on the outer surface only with a few pseudopores or true pores in the upper part of the leaf. Plants generally remarkably large and robust xxxii. *S. crassicladum* Warnst.

22. St. l. as in *S. crassicladum*, but the hyaline cells with numerous pores on both surfaces.
xxxiii. *S. batumense* Warnst.

§ VIII. *Sphagna cymbifolia* Schimp. Spp. 36–42.

23. Chlor. cells of br. l. in section equilateral-triangular to isosceles-triangular or broadly trapezoid, with usually the wall of equal thickness all round, the cell-lumen nearer the inner surface of the leaf, and therefore not median. Hyaline cells more strongly convex on the outer surface of the leaf, and here the chlor. cells are completely enclosed or they are free on both surfaces 24

23. Chlor. cells of br. l. in section very narrow or broader spindle-shaped to narrow barrel-shaped or almost rectangular with the lumen almost or quite median, and with the wall on the inner surface of the leaf much thickened and free ; on the outer surface either completely enclosed by the more strongly convex hyaline cells, or free on both surfaces 26

23. Chlor. cells of br. l. in section elliptic, median, and on both sides completely enclosed by the slightly convex hyaline cells, which are united together for some distance; on the inner wall of the hyaline cells where they are united to the chlor. cells, almost always smooth, only in the rarest cases with extremely minute papillæ; stem cortex with few fibrils . . . . . xlii. *S. medium* Limpr.

24. Chlor. cells of the middle part of the br. l. in section wide equilateral-triangular, on the outer surface completely enclosed by the strongly convex hyaline cells, or broad trapezoid and free on both surfaces; on the inner wall of the hyaline cells where they are united to the chlor. cells, without papillæ but on both sides of the chlor. cells with so-called comb-fibrils, which are rarely absent; transverse walls of the cortical cells of the branches level, not bent downward. St. l. generally non-fibrillose.
xxxvi. *S. imbricatum* Russ.

24. Chlor. cells broadly isosceles-trapezoid with the longer parallel side on the inner surface; hyaline cells always non-papillose; st. l. almost always fibrillose 25

24. Chlor. cells narrowly isosceles-triangular to narrow-trapezoid or almost spindle-shaped, with the wall usually of equal thickness all round, rarely somewhat thickened on the inner surface of the leaf; on the outer surface enclosed by the strongly convex hyaline cells or free as on the inner surface; hyaline cells always non-papillose; stem cortex as also generally the st. l. with numerous fibrils.
xxxix. *S. cymbifolium* Limpr.

25. Chlor. cells up to 15 μ wide; hyaline cells owing to the great broadening of the chlor. cells remarkably narrow; cells of stem cortex non-fibrillose, or only here and there with delicate indications of fibres; st. l. sometimes non-fibrillose, sometimes with numerous fibrils. Plant completely submerged and in habit showing little resemblance to a *cymbifolium*-form.
xxxvii. *S. degenerans*, Warnst.

25. Chlor. cells up to 12 μ wide; rarely broadly isosceles-triangular (usually trapezoid); hyaline cells much wider than in *S. degenerans*; cells of stem cortex with numerous fibrils; st. l. fibrillose almost to the base. Plant not submerged and in habit resembling a *S. cymbifolium* with more squarrose leaves . . . xxxviii. *S turfaceum* Warnst.

26. Chlor. cells extremely narrow; hyaline cells non-papillose; st. l. usually without, rarely with fibrils, and their hyaline cells not septate . . . . . xl. *S. centrale* Jensen.

26. Chlor. cells wider; hyaline cells on the inner wall where they are united to the chlor. cells always more or less papillose; st. l. with or without fibrils and their hyaline cells generally septate . . . . xli. *S. papillosum* Lindb.

(To be continued.)

THE NOMENCLATURE OF PLATYCERIUM.

By W. Carruthers, F.R.S.

My recent examination of the nomenclature of this genus makes it clear that some changes must be made in the received names of the species. The genus first appeared in literature in the writings of Plukenet. In his *Mantissa*, p. 82 (1700), he describes a plant from Johanna Island as "Filix sive Hemionitis multifida platyceros, s. segmentis coriaceis, cornu cervinum referentibus, aversa parte canescentibus." The specimen described is preserved among Plukenet's plants in Herb. Sloan. vol. xcii. fol. 70, and is a good specimen of *Platycerium alcicorne* Desv. In his *Amaltheum* he describes a smaller specimen of the same species, also from Johanna Island. Both these plants were most probably collected by Patrick Adair, M.D., to whom Plukenet was indebted for many South African plants. This he described under the name of "Neuroplatyceros Æthiopicus, nervosis foliis, cornu cervinum referentibus," *l.c.* p. 151 (1705), and figured in his *Phytographia*, t. 429, f. 2. The specimen is in Herb. Sloan. vol. 102, fol. 194. In 1794 Willemet published his Herbarium Mauritianum (*Usteri Annal. Bot.* xviii. 61), and he there describes this species under the name *Acrostichum alcicorne*. The material on which it was founded was given him by Stadtmann, who collected it in Madagascar. Swartz, in his *Genera et Species Filicum* (Schrader, *Journ. Bot.* vol. ii. for 1800), independently, as it appears, employed the same name for Plukenet's plant, having no more information than what he gleaned from Plukenet's figure and description. Cavanilles, in *Anal. Hist. Nat. Madrid*, 1799, p. 105, described under the name of *Acrostichum bifurcatum* a plant from Port Jackson, New South Wales, which Robert Brown afterwards, in his *Prod. Fl. Nov. Holl.* (1810), p. 145, referred to *A. alcicorne* Sw. When Desvaux, in his "Prodrome des Fougères," published in the *Ann. Soc. Linn. Paris*, 1827, p. 213, established the genus *Platycerium*, he considered the Australian plant to be specifically different from *A. alcicorne*, and called it *P. angustatum* Desv. In this opinion he has not been followed by later systematists—Hooker, Fée, Baker, &c.—so that Desvaux's name must be placed as a synonym of *P. alcicorne*. In 1844–5 Fée, in his *Hist. Acrost.* (p. 102), introduced the first word of Plukenet's descriptive name as if it had been meant by its author to be of generic value, and relegated *Platycerium* Desv. as a synonym. This obviously cannot be adopted. Fée, further mislead by the general designation "Æthiopicus," referred Plukenet's plant to a species found in Western Tropical Africa, which had already been described and figured by Palisot-Beauvois in 1804. Fée gives a very good figure, *l.c.* tab. 64, of this plant, and he says Plukenet's figure is "mala," as it undoubtedly is for the species to which he refers it. Hooker, in his *Garden Ferns*, tab. 9 (1862), and *Sp. Fil.* v. p. 283, follows Fée in regard to the species, but calls it *Platycerium Æthiopicum* Hook., characterizing Plukenet's figure as a "young and very imperfect fertile frond."

T e next species of the genus to be published was one found in 1778 or 1779 by J. G. König in Siam. He sent a parcel of plants to O. F. Müller in 1783, and among them this *Platycerium*, which he named *Osmunda coronaria*. Müller printed, in the *Halle Naturforscher*, St. 21, p. 107 (1785). the name and description of the plant from König's manuscript, and gave a singularly good figure of the plant (tab. 13). A careful description of the species is to be found on p. 298, vol. ii. of König's manuscripts, preserved in the Botanical Department, British Museum. Swartz placed the species in *Acrostichum*, and called it *A. biforme* Sw. (Schrader, *Journ. Bot.* 1880, ii. (1801)), his only materials being the description and figure in the *Naturforscher*. Desvaux included it among the species of his genus *Platycerium* as *P. coronaria* Desv., giving *A. biforme* Sw. as a synonym. When Blume published his description and figure in his *Flora Javæ* (1828), (*Filices*, p. 44, t. 18), he named it *Platycerium biforme* Bl., and under this name it generally occurs in systematic books. Wallich distributed specimens (No. 20 in his List) from Singapore with the name "*Acrostichum fuciforme* Wall. Herb. 1823."

A third species was added to the genus in the plant described by Palisot-Beauvois in the *Flore d'Oware*, p. 2 (1806), and figured tab. 2. He applied to it the name *Acrosticum stemaria*, given by Commerson to a plant in Herb. Juss. from Madagascar, which was no doubt *P. alcicorne* Desv. Palisot-Beauvois quotes Plukenet's descriptive name, and refers to his figure, and points out the close resemblance between Plukenet's plant and his own, and thinks it may be an allied species, but it might be the same. Desvaux, when he separated the genus in his Prodrome, *l. c.* p. 213, included this plant as *P. stemmaria* Desv. Fée, in his revision of the *Acrostichea*, believing Plukenet's plant to be the same as Palisot-Beauvois', set aside Desvaux's generic name, and adopted "*Neuroplatyceros* Pluk.," and called this species *N. Æthiopicus* Pluk., employing the first two words of Plukenet's descriptive name as if they were in conformity with the binomial nomenclature introduced by Linnæus many years thereafter. Hooker, following Fée, placed it in *Platycerium* as *P. Æthiopicum*, quoting as a synonym "*Neuroplatyceros Æthiopicus* Pluk."

Welwitsch found a new species of this genus in Angola, which he communicated to Baker, who referred it to *P. stemmaria* Pal.-Beauv., though he published Welwitsch's name *P. angolense*, with a description sufficient to enable one to identify it, in *Synopsis Filicum*, p. 425 (1868). In 1870 Schweinfurth found the same species in his expedition to Niam-Niam, and in the following year published a description and figure of it in *Bot. Zeit.* xxix. 361, under the name *P. Elephantotis* Schweinf. Baker, in his *New Ferns* (1892), considers Schweinfurth's plant to be identical with Welwitsch's, but places it under *P. æthiopicum* Hook., that is, *P. stemmaria* Desv., from which it is certainly different. The other species of *Platycerium* have happily as yet no synonyms.

The synonymy of these species will consequently be as follows :—

Platycerium alcicorne Desv. in Ann. Soc. Linn. Paris, vi. 213 (1827).

Filix sive Hemionitis multifida platyceros, &c. Pluk. Mantissa, 82 (1700).

Neuroplatyceros Æthiopicus, nervosis foliis, cornu cervinum referentibus. Pluk. Amalth. p. 151 (1705), Phytogr. t. 429, fig. 2.

Acrostichum alcicorne Willem. in Usteri Ann. Bot. xviii. 61 (1794); Sw. in Schrader, Journ. Bot. 1800, ii. p. 11 (1801); R. Br. Prod. p. 145 (1810).

A. bifurcatum Cav. in Anal. Hist. Nat. Madrid, i. 105 (1799).

Platycerium angustatum Desv. *l. c.* (1827).

Neuroplatyceros alcicorne Fée, Acrost. 103 (1844).

Platycerium coronarium Desv. *l. c.* (1827).

Osmunda coronaria König in Halle Naturforscher, xxi. 107 (1785).

Acrostichum biforme Sw. *l. c.* (1801).

Platycerium biforme Blume, Flor. Jav., Filices, 44, t. 18 (1828).

Acrostichum fuciforme Wall. List, No. 20 (1828).

Neuroplatyceros biformis Fée, Acrost. 104 (1844).

Platycerium stemmaria Desv. *l. c.* (1827).

Acrosticum stemaria Pal.-Beauv, Flore d'Oware, p. 2 (1804).

Neuroplatyceros Æthiopicus Fée, Acrost. p. 103 (1844).

Platycerium Æthiopicum Hook. Sp. Fil. v. 283 (1864); Hook. & Bak. Syn. Fil. 425 (1868).

Platycerium angolense Welw. apud Hook. & Bak. Syn. Fil. p. 425 (1868).

P. Elephantotis Schweinf. Bot. Zeit. p. 361 (1871).

P. æthiopicum Hook. in part; Hook. & Bak. Syn. Fil. p. 425 (1868); Baker, New Ferns, 1892, p. 114.

NOTES ON POTAMOGETON.

By Arthur Bennett, F.L.S.

Potamogeton serrulatus Regel & Maack, Tent. Fl. Ussur. 139, 1861.

Ad fluv. Sungatschi, Ussuria; leg. Maack (lat. 45°, long. 134°); ex herb. Petrop. Herb. Kew.!

Mandschuria: Act. Petrop. "Species ipsis auctoribus dubius."

Japan: Lac d'Akan; Lac de Numasaki; Plaine Kashimadai près Scuden. Faurie sp.

Hakona: Prov. Sagami, 3.8.1883. Jap. name "Scuniumo." "Ex Science College, Imp. University. Herb. Kew.!

P. Robbinsii Oakes, var. *japonicus* Ar. Benn. in Bull. Herb. Boissier, 1896, p. 257.

This plant has always been a puzzle to me. The description seemed to point to some narrow-leaved *crispus* form; and it was not till Father Faurie sent me Japanese specimens that I began to understand what it was. These seemed at first to be a variety of a

very interesting North American species, *P. Robbinsii* Oakes, and I described the plant as such in Bull. Herb. Boissier, 1896, p. 257. The authors say: "Specimina Maackiana floribus fructisque carent. Habitus omnino *P. obtusifolii*, foliis autem sub lente tenuiter arguta serrulata."

There is in the Kew Herbarium a specimen named "*P. crispus* γ *serrulatus* Schrad. Yokohama, Japan, 1862, ex Science Coll. Imp. Univ."

Though differing considerably in habit from the usual form of *P. Robbinsii*, I could see no good characters by which it could be separated as a species. *P. Robbinsii* very rarely fruits; for years a single fruiting specimen, gathered in Oregon by Hall, was the only example known, but it has since been gathered in Jamaica Pond, Massachusetts (*Hill*); Chiesgo Lakes, Minnesota; Goose Lake, Michigan (*Hill*); and in the Somas river at Alberni, in Vancouver's Island (*Macoun*).

In Japan we have a remarkable commingling of species of *Potamogeton*. Of endemic species there are *P. oxyphyllus* Miq., *P. Miduhikimo* Makino, and *P. nipponicus* Makino; the material for this last is scanty, and it is perhaps a form of some other species. The other species are *P. cristatus* Reg. & Maack, known only from Manchuria, China proper, and Ussuria; *P. Tepperi* Ar. Benn., China, India, Siberia, and Australasia; *P. Gaudichaudii* Cham., Ladrone Isles, China, Spice Archipelago, and Borneo; *P. javanicus* Hassk., India, China, Africa, Australia; *P. indicus* Roxb., from Tibet to Ceylon and the Andaman Isles; *P. gracilis* Wolfg., Siberia and North Europe: while of European species *P. prælongus* Wulf., *P. natans* L., *P. polygonifolius* Pourr., *P. fluitans* Roth, *P. alpinus* Balb., *P. heterophyllus* Schreb., *P. nitens* Weber, *P. perfoliatus* L., *P. crispus* L., *P. zosterifolius* Schum., *P. pusillus* L., *P. pectinatus* L., and *P. flabellatus* Bab. There is also at least one new species not yet described, which seems to connect *P. Oxyphyllus* with *P. zosterifolius* (*acutifolius* section). Father Faurie's No. 1058 in the Paris Herbarium may also be a new species, allied to *P. trichoides*, or it may be immature *P. Miduhikimo*, but the material is insufficient for description. Nowhere else in the world can such an assemblage of species be found.

It may be of interest to American botanists to know that *P. Robbinsii* was first collected by Nuttall at Cambridge, Mass., and was indicated by him as a new species; specimens from him are in the British Museum and Kew herbaria, and also in De Candolle's herbarium, where it is stated to have been collected in 1825.

P. NITENS Weber, Suppl. Fl. Holsat. p. 5 (1787).*

Some time before his death, my friend Dr. Morong wrote me concerning some specimens of *Potamogeton* from Wenham Lake, U.S.A. Some of these specimens he had sent to Dr. Tiselius,

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* This is a rare book, and I am not aware that there is a copy in this country, so it may be well to say that the description is reprinted in this Journal for 1896, p. 2.

of Stockholm, and he informed me that Dr. Tiselius referred the specimens to *P. nitens* Weber. Some of the specimens seemed to me to indicate an affinity with *P. undulatus* Fryer (non Wulfg.), but Mr. Fryer on seeing them noted on the sheet, "too many veins for *undulatus*."

Among a large series of North American specimens of the genus sent me by Dr. Morong were other and more developed specimens; these appear to me to confirm Dr. Tiselius's opinion. One of the specimens is so like some of Nolte's that I believe, were the labels changed, no one would discover the difference. I say of "Nolte," because I believe with Mr. Fryer the original plant Weber had in view was more like Mr. Fryer's f. *involuta*.* I have a specimen, kindly sent from the Kiel Herbarium, of the plant to which Weber refers—*i. e.* one named as a var. of *lucens* by Ehrhart, and referred by him to his *nitens*. Mr. Fryer sent me a drawing of a cultivated plant of *nitens* in Nov. 1892, which in the upper leaves is quite like Ehrhart's plant, and much resembles the floating leaves of *P. lonchites* (small form), and especially of *P. Claytonii*. I have come to the conclusion that we must quote Weber for *nitens;* Dr. Tiselius cites Nolte as the authority, and we have many specimens named by him; but the idea that Weber's plant might have been *polygonifolius* I think cannot be upheld. It is said that Weber's description is not accurate in every detail, but what old descriptions are? We must always remember what scanty material the earlier botanists often had to deal with. Moreover, *P. polygonifolius* is not recorded from North America, a very doubtful plant from Newfoundland excepted. *P. lonchites* in some conditions is very similar to some states of *P. Claytonii*, so much so, that I have specimens cross-named by American collectors. And Nolte himself (Nov. Fl. Holsat. p. 18), under *P. heterophyllus* Schreb., says, "Affinis est hæc species *P. nitenti* Weberi." Weber's herbarium seems to have been in the possession of a chemist at Neustadt, but I have been unable to trace it further. Prahl (Krit. Fl. Schlesw.-Holst. p. 207) gives under *nitens* "Nortorf in Gräben (Weber 1780)"; this is in Schlesvig. In this Journal for 1865, p. 259, Prof. Babington considers the *P. lanceolatus* of Reichenbach's *Icones* as "almost certainly a state of *P. nitens*." Reichenbach himself refers it to *P. Zizii* var. *elongatus;* there is in the De Candollean herbarium a specimen of *nitens* named "*P. lanceolatus* Sm. *β latifolium* Besser in herb.": I can find no other reference to connect the two. If *P. nitens* Weber were abandoned, the name to be adopted would be *P. curvifolius* Hartmann, Skand. Fl. ed. 1, p. 78, 1820: this is six years before Nolte's, which was published in 1826.

P. Curtissii Morong in Bull. Torr. Bot. Club, xiii. 145 (1886); and N. Amer. Naiad. (Mem. Torr. Bot. Club, iii. part 2, p. 36, t. 43 (1893)).

This rare species is known by very few specimens; no fruit has yet been seen, and its habitat (Florida) is remote and rarely visited. Dr. Morong makes no comment on its affinities. In his clavis he

* Journ. Bot. 1896, pp. 1–3, tt. 353–4.

places it between *P. confervoides* Reich. and *P. crispus* L., probably more for convenience than as suggesting any particular systematic inference. I told Dr. Morong that in habit it reminded me of the growth of *P. trichoides*, but he did not agree. The peduncles are certainly very short for that species, but the same peculiar curl of the leaves is seen in both, and is not the result of drying. The stems in the specimens I possess afford no character in section, but they are so desiccated that nothing I have used will act on them; and the structure of the leaves affords no certain test. The plant must be left doubtful until better and more abundant material is forthcoming.

P. LATERALIS Morong in Bot. Gaz. v. 51 (1880); N. Am. Naiad. t. 52, p. 44.

The only species I know that can be compared with this is *P. Miduhikimo* Makino, Ill. Fl. Japan, v. 1, No. 9, p. 2, t. 54, 1891, especially the separate piece in the lower left-hand corner, though I have some suspicion that this may have been drawn from a piece of *P. javanicus* Hassk.; the two are often mixed together in gatherings, and are not easy to separate unless in fruit. These two and *P. cristatus* Reg. & Maack, along with specimens from Japan named "*P. hybridus* Michx.," have been much mixed together and cross-named. *P. hybridus* is not known from Japan. I should not be surprised to see the combination of *pauciflorus* Pursh × *hybridus* Michx., suggested for *lateralis*, or, to follow Dr. Morong's nomenclature, *foliosus* Rafn × *diversifolius* Rafn.

P. MYSTICUS Morong, Bot. Gaz. v. 50, 1880; and N. Am. Naiad. t. 41, p. 34.

This is another North American plant that will perhaps prove to be of hybrid origin. It much resembles (especially the flowering shoots) small *nitens* or *perfoliatus*: but this must be studied on the spot. "Mystic Pond, Medford, Mass.," is "the sheet of water in which the early American investigators of this genus found so many of their plants."—Morong, *l. c.* Specimens of the plant are in the British Museum and Kew herbaria.

P. STENOSTACHYS Schum. in Fl. Brasil. iii. 687, t. 119, fig. 1 (1894).

Dr. Schumann kindly sent me a specimen of this for inspection. It seems to me most to resemble a large *polygonifolius*. I have seen in that species the development of the stipules almost as great as in *stenostachys*; but at present the material is too scanty for any positive conclusion.

P. SCLEROPUS Schumann in Fl. Brasil. iii. 688, t. 120, fig. 2, 1894.*

By the kindness of Herr Baagoe, of Nævsted, Denmark, I possess a specimen of Dr. Schumann's plant. In the *Flora Brasiliensis* nothing is said as to its affinities. Broadly, it is the South American representative of the North American *P. Claytonii* Tuck. (*P. epidydrum* Rafin.), and is probably the nearest to that species

* See Journ. Bot. 1895, p. 373.

of those known. It seems sufficiently distinct in its fruit; in the upper and lower leaves the nervation is the same and so is the habit the same, but the peduncle in the specimen sent me is 3 in. long, the spike $\frac{5}{8}$ in. Morong (N. Am. Naiad. p. 18) says of *Claytonii*, "peduncles 1–5 in. long." In a specimen from Hastings Co., Canada (*Prof. Macoun*), the peduncles are from 3 to $4\frac{3}{4}$ in. long; but the plant is evidently unusually elongated, and the spikes proceed from intermediate leaves, an unusual thing in this species. On another from Uxbridge, Mass., the peduncles are 4 in. long; out of twenty-two other specimens in my herbarium the longest peduncle is $2\frac{1}{4}$ in. On my specimens from Porto Rico (*Sintenis*, Nos. 1025, 2537) the peduncles and spikes are much like *scleropus;* the specimens are only in bud, but the plant is probably rightly referred to *Claytonii*. They want the characteristic lower leaves of that plant, but in habit are between *Claytonii* and *scleropus*. I believe they grew in running water, while *Claytonii* is usually a lake and pond species. In the upper leaves in *Claytonii* the nerves vary from 12 to 27 (*Morong*). But in specimens of the *same width* as *scleropus* they are the same. Unfortunately, my specimen of *scleropus* has only the immature fruit, but I suppose that figured by Dr. Schumann "fr. × 9" would be mature, and this with the section "× 10" would seem to distinguish it sufficiently from *P. Claytonii*. The figure shows the embryo only coiled two-thirds of a circle, while that of *Claytonii* is "coiled $1\frac{1}{3}$ times" (*Morong*).

P. LONCHITES Tuckerman. While writing on North American species, I may mention that Nolte in his herbarium (Brit. Museum) identified Tuckerman's plant with *P. americanus* Cham. (in Linnæa, ii. 226, 1827). Dr. Morong puts a query to this in his N. Am. Naiad., but he agreed with me that it must be so referred. Neither of us had ever seen type-specimens of *americanus*, but it is quite possible Nolte had seen them, as some of the herbarium sheets of *Potamogeton* at Berlin are noted by him, and he was contemporary with Chamisso.

When describing *P. Claytonii*, Tuckerman (in Silliman's Journ. 1st ser. xiv. 38, 1843) referred the "P. foliis lanceolato-oblongis petiolis longis" of Gronovius (Fl. Virg. 139, 1762) "ex parte certe" to that plant; but Clayton's type (no. 664) (in Herb. Brit. Mus.) is certainly *P. lonchites*. In the fuller account of *P. Claytonii* in the same journal, 2nd ser. vi. 228 (1848), he omits this reference. Under *P. nitens* I have noted that *Claytonii* and *lonchites* are cross-named by American collectors; young elongated specimens of *Claytonii* bear at first sight considerable likeness to *lonchites*.

[The following note may be added here:

P. SPATHULÆFORMIS (Robbins) Morong in N. Amer. Naiad. p. 26, t. 35. Dr. Morong adopts this name from Asa Gray's *Manual*, ed. 5, p. 487 (1878), where it stands as "Var.? *spathulæformis*" under *P. gramineus;* and the same name is retained in what is known as the "American Check-list" and in Britton and Brown's *Illustrated Flora*. The name, however, is based on the assumed permanence of the varietal name and on an exaggerated application of the

"priority of place" claim; neither of which principles has as yet received universal recognition. With regard to the latter, "*P. spathæformis* Tuckerman in herb." immediately follows "Var.? *spathulæformis* in Gray's *Manual*" (l.c.) and Tuckerman's name will, I imagine, be adopted by those who do not accept what is called the "Rochester Code." It seems probable that he wrote "spathulæformis," as "spathæformis" would have no appropriate significance.

It is remarkable that neither the "Check-list" nor the *Illustrated Flora* cites the synonym *P. varians* Morong, published by Mr. Fryer and figured in this Journal for 1889 (pp. 33–36, t. 287); and even more remarkable that Dr. Morong, publishing in 1893, should make no reference to Mr. Fryer's published figure and description, although his observations and specimens are referred to, and the fruit in Dr. Morong's plate is figured from British specimens. The synonymy of the plant is as follows:—

P. SPATHÆFORMIS Tuckerman ex Robbins in A. Gray, Man. Bot. N.U.S. ed. 5, p. 487 (1878).
P. gramineus L. var.? *spathulæformis* Robbins, *l.c.*
P. varians Morong ex Fryer in Journ. Bot. 1889, p. 33, t. 287.
P. spathulæformis Morong in Mem. Torr. Bot. Club, iii. pt. 2, 26 (1893).

Perhaps, however, as has been suggested above, it should be quoted as

P. SPATHULÆFORMIS Tuckerman (sphalm. *spathæformis*), &c.—

ED. JOURN. BOT.]

ARTEMISIA STELLERIANA IN NEW ENGLAND.

[THE following paper by Mr. M. J. Fernald of the Gray Herbarium, published in the February number of *Rhodora* (pp. 38–40), forms a useful pendant to that by Mr. N. Colgan printed in this Journal for 1894, pp. 104–6, and is therefore here reprinted in the belief that it will be of interest to our readers. It may be noted that in the *Cybele Hibernica* (ed. 2, p. 495) the plant is noted by Mr. Colgan as "spreading on the North Bull in 1898."—ED. JOURN. BOT.]

ONE of the most conspicuous plants of sand-dunes and the drier portions of many sea-beaches of New England is *Artemisia Stelleriana*, a species first described from Kamtschatka. Yet, abundant as is the plant about many of our long-visited resorts—Mt. Desert, Old Orchard, Nahant, Nantasket, Truro, Martha's Vineyard, Narragansett Pier, Newport, and New London, as well as Long Reach and Sandy Hook—it was apparently unrecorded in our botanical literature until within the last quarter-century. Probably the first station noted in eastern America was at Nahant, Massachusetts, in 1877. A specimen collected there, or on the adjacent Lynn Beach, by Dr. W. G. Farlow, in 1879, is labelled "growing wild in large tufts," and of this station Mr. John Robinson wrote in 1880,

"evidently increasing quite rapidly." A specimen collected by Miss G. H. Learned at New London, Connecticut, in 1892, is marked "well established." These notes of Dr. Farlow, Mr. Robinson, and Miss Learned, then, as well as Dr. Britton's records of the plant in his New Jersey catalogue, indicate their belief that the plant is introduced.

On the other hand, there is a rather general idea that the plant is indigenous on our coast. In the *Synoptical Flora* and in the last edition of Gray's *Manual* this is suggested, though with some doubt; in various local floras the plant is treated in the same non-committal way; and in the *Illustrated Flora*, though its introduction into eastern America may be inferred, no definite statement to that effect is made, as is done in case of *A. Absinthium*, *A. Abrotanum*, *A. annua*, etc. Thus, as treated in standard works, the exact status of the species in our flora is not clearly defined.

It is a significant fact that this very conspicuous plant was not seen upon the New England coast until 1877, and that from that date until the present time it has appeared in ever-increasing abundance at points long known and visited by botanists. Furthermore, in 1876, the plant was discovered in dry sand on the coast of Skåne, the southernmost province of Sweden, "the most thoroughly examined province of Sweden from the botanist's point of view"; in 1891 it was found on the sandy coast at North Bull, County Dublin, Ireland; in 1892, on the coast of Zealand, Denmark; and in 1895 on the sands between Penzance and Marazion, in Cornwall.

In the *Journal of Botany* for 1894, and previously in a Swedish journal, *Botaniska Notiser*, Professor Areschoug discussed* at length the occurrence of this Kamtschatkan plant in Europe and America, favouring the view that it has long been a member of our flora, until recently overlooked because of its habitat—barren sands which are rarely visited. He further argued that the plant must have spread laterally from northern Asia to Europe and America immediately after the Glacial Period, before the return northward of the flora which now characterizes so much of Europe and America, and that although not yet known to us it will be found in many sandy river-valleys of North America.

Replying to Professor Areschoug's most interesting and ingenious argument, Mr. Nathaniel Colgan showed† very conclusively that the extensive colony of the plant found by him in County Dublin had originated from waste fragments thrown upon the sand from a neighbouring nursery. The simple explanation given by Mr. Colgan of the origin of the colony in Ireland is essentially applicable to our American stations. If this very conspicuous plant were indigenous upon Old Orchard, Nahant, Martha's Vineyard, and other sandy shores, it is singular that no one observed it before 1877. Mr. Walter Deane informs me that in his youth he was familiar with Old Orchard Beach, and that at that time this *Artemisia* was not

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* Botaniska Notiser, 1880, 137, and 1893, 111; Journ. Bot. xxxii. 70.

† Journ. Bot. *l. c.* 104.

seen; in Tracey's list (1858) of the plants of Lynn it is not mentioned; nor does the late Dr. Morong note it in his paper* upon the flora of Martha's Vineyard. However, in the seventies *A. Stelleriana* was popular in America, as well as in Europe, as a bedding plant. For a few years it was used very extensively for its mass of grey foliage, and to day, in many old-fashioned gardens in Maine, it is still a favourite under the name "Dusty Miller." Professor Areschoug argued that because the plant rarely spreads from gardens to the neighbouring districts, and because it abounds on sand-dunes and beaches remote from gardens, it cannot have escaped from cultivation to its present coastal stations. It cannot be stated with assurance that the plant has reached the New England sea beaches directly from neighbouring gardens; but a statement made by a nurseryman, attempting to account for the colony in County Dublin, and quoted by Mr. Colgan in his article above cited, may as well apply to our own as to the Irish station: "It is a plant of the freest possible growth. Any bit of the top or rootstock swept out with refuse would be sure to grow. . . . . Tops have often been used for mixing with cut-flowers, and may have assisted in the make-up of breast-bouquets, which, worn by some visitor to the North Bull, may have been thrown away as withered, and have got covered with sand." In view, then, of the very striking habit of the plant, its sudden appearance on sea-beaches and sand-dunes, especially in the neighbourhood of summer resorts, soon after its popularity as a bedding plant, there seems no doubt that *Artemisia Stelleriana* was originally introduced along our coast, and that we have no reason longer to regard it as a species native to New England.

ALCHEMILLA VULGARIS IN IRELAND.

By Edward F. Linton, M.A.

In a paper on "*Alchemilla vulgaris* and its segregates" in this Journal (1895, p. 110), the Irish distribution of the group was left alone, since the few notes I had been able to collect together could give no fair idea of it. During the last three years Mr. R. Ll. Praeger has sent me a large number of *A. vulgaris* (aggregate) specimens to criticize or name from many parts of Ireland; and, though his contribution of records now far outnumbers those I have otherwise gathered together, he has kindly permitted me to incorporate his observations in my notes; where not otherwise indicated, the localities quoted are from Mr. Praeger. I have also to thank Mr. S. A. Stewart for a few specimens, indicated by *S. A. S.*

In the following statement the counties and vice-counties are numbered in accordance with the scheme set forth by Mr. Praeger in his paper on the "Botanical Subdivision of Ireland" (Journ. Bot. 1896, 57).

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* Field and Forest, iii. (1878), 119.

A. VULGARIS L., *sensu restricto*. *A. pratensis* Schmidt. 9. Clare, *hb. R. P. Murray*. 22. Meath, near Oldcastle. 23. Westmeath, *H. C. Levinge; Praeger*. 24. Longford. 25. Roscommon, by Lough Key. 29. Leitrim. 30. Cavan, near Lough Sheelin. 33. Fermanagh. 36. Tyrone,; Cookstown, *Miss M. C. Knowles*. 38. Down, near Holywood. 39. Antrim, *S. A. Brenan*; near Belfast, *S. A. S.*; Dunloy, and White Park Bay.

A. ALPESTRIS Schmidt. *A. vulgaris* L. var. *glabra* Mert. & Koch, 1823 (non DC., 1805). 10. North Tipperary. 16. West Galway, near Recess. 27. West Mayo, near Castlebar, *E. S. Marshall*. 28. Sligo, Keishcorran, and another locality. 29. Leitrim. 33. Fermanagh, at Carrickreagh, by Lough Erne. 35. North Donegal, by Lough Salt, *hb. Brit. Mus.* 36. Tyrone, near Omagh, *Miss M. C. Knowles*. 39. Antrim, *hb. Science & Art Mus. Dublin*; near Belfast, *R. P. Murray*; Dunseverick; Squires Hill, near Belfast, *S. A. S.*

A. FILICAULIS Buser (*Bull. de l'Herb. Boissier*, i. App. 2, p. 22, 1893). 1 or 2. Kerry, *hb. Brit. Mus.* 5. East Cork, *hb. Brit. Mus.*; *hb. Science & Art Mus. Dublin*; both gatherings being from Fermoy. 6. Waterford, Cappoquin, *Praeger*; also *hb. Science & Art Mus. Dublin*, from Kilmacow. 7. South Tipperary, Fethard. 10. North Tipperary. 11. Kilkenny, Ballyragget. 13. Carlow. 14. Queen's County, base of Arderin. 15. South-east Galway, about Woodford. 16. West Galway, recorded from Clonbur (Journ. Bot. 1896, p. 254), *E. S. Marshall*. 17. North-east Galway. 18. King's County. 19. Kildare. 21. Dublin. 23. Westmeath, by Lough Deraveragh. 24. Longford. 25. Roscommon, Mote Park. 29. Leitrim. 31. Louth, near Kearney's Cross. 36. Tyrone, near Omagh, *Miss M. C. Knowles*. 37. Armagh, near Tynan Abbey, *S. A. S.* 39. Antrim, on Cave Hill, Belfast, *S. A. S.*; Knockagh. 40. Derry, *fide S. A. S.*

The names of the localities have not in all cases been preserved in my notes, but, with the exception of the last record above and the two from the Rev. E. S. Marshall, every specimen has passed under my eye; and I am well assured that these three exceptions also were rightly named. It is a little remarkable that the distribution of *A. filicaulis* Buser should be twice as extensive as either of the other two; the list of records for the type in particular seems shorter than it should be, since in Great Britain these two are almost evenly distributed.

SHORT NOTES.

PEMBROKESHIRE MOSSES.—A collection of mosses made in the neighbourhood of St. David's, which was some time since submitted to me by the Rev. W. R. Linton, contains a number of species which, as far as I know, have not been recorded for the county. I give the names of those which are additions to the short list published in this Journal (1898, p. 188):—

Sphagnum subsecundum var. *contortum* Schp.—*Polytrichum aloides* Hedw.—*Campylopus flexuosus* Brid. An ordinary form and one with

an unusually broad nerve. — *C. atrovirens* De Not. — *C. brevipilus* B. & S. — *Leucobryum glaucum* Brid. — *Grimmia pulvinata* Sm. — *G. trichophylla* Grev.—*G. subsquarrosa* Wils. A barren plant which I take to be this species, but differing somewhat in habit and with the hair-point unusually long.—*Rhacomitrium heterostichum* Brid.—*R. lanuginosum* Brid. — *R. canescens* Brid. — *Glyphomitrium Daviesii* Brid.—*Hedwigia ciliata* Ehrh.—*Pottia recta* Mitt.—*P. crinita* Wils. —*Tortula subulata* Hedw. — *Barbula tophacea* Mitt. — *Weisia microstoma* C. M.—*Trichostomum mutabile* Br., c. fr.—Var. *littorale* Dixon. With an intermediate form, — *T. flavo-virens* Br. — *Zygodon viridissimus* R. Br. — *Funaria ericetorum* Dixon. — *F. Templetoni* Sm. — *Aulacomnium palustre* Schwgr. — *Webera annotina* Schwgr. A remarkable form or variety with very short and small capsules, turbinate and wide-mouthed when mature and empty, resembling those of *W. gracilis*, but with the leaves and habit of *W. annotina*. —*Bryum pendulum* Schp.—*B. intermedium* Brid.—*B. alpinum* Huds. —*Eurhynchium myosuroides* Schp. — *E. pumilum* Schp. — *Plagiothecium Borrerianum* Spr.—*Hypnum chrysophyllum* Brid.—*H. Wilsoni* Schp. Not the typical plant. Habit somewhat of *H. lycopodioides*, but nerve too wide and strong. Auricles very indistinct, almost obsolete.—*H. revolvens* Sm.—*H. commutatum* Hedw.—*H. molluscum* Hedw. — *H. cupressiforme* var. *ericetorum* B. & S. — Var. *elatum* Schp. — *H. giganteum* Schp. — *Hylocomium splendens* B. & S. — *H. triquetrum* B. & S.—H. N. Dixon.

Ulota phyllantha var. stricta, mihi.—On looking through a large collection of mosses made in various parts of the British Isles by Dr. P. B. Mason, of Burton-on-Trent, in the course of several years, I came upon a specimen of a species of *Ulota*, which I could not refer to any described form. Under the microscope the leaves show a complete agreement with the non-gemmiferous leaves of the *U. phyllantha* Brid., though, being scarcely crisped, they have a very different appearance when dry, and they are, moreover, entirely destitute of the characteristic gemmæ. I have submitted specimens to Mr. H. N. Dixon and to Mr. J. E. Bagnall, neither of whom were acquainted with the form, and the latter has suggested that I should publish it as a variety, under the name of var. *stricta*.

Ulota phyllantha Brid. var. stricta, n. var.—Stems elongate, rather more branched than in the type; leaves straight, erect, scarcely altered in direction and only slightly crisped when dry, with the nerve ceasing below the apex, without gemmæ.

Habitat. Rocks by the sea, on the Island of Stroma, in the Pentland Frith (*Dr. P. B. Mason*).—W. E. Nicholson.

Basidiomycetes new to Britain. — The following species are represented by drawings or dried examples, or both, in the British Museum Collection:—*Stereum conchatum* Fr.; *Næmatelia rubiformis* Fr.; *Lycoperdon hiemale* Bull.; *L. furfuraceum* Schæff.; *Hymenogaster lycoperdineus* Vitt.—W. G. Smith.

Ranunculus intermedius, Knaf.—It has been pointed out to us by more than one foreign botanist that *Ranunculus intermedius* Knaf is a form of *R. peltatus*, and not the plant of the South and West of

England formerly referred to *R. tripartitus* and to which the name of *intermedius* has usually been applied by British botanists. This view is held by Herr Freyn, who has given particular attention to the question. Upon referring to Knaf's original description of *R. intermedius* in *Flora*, 1846, p. 289 (from Bohemia), we find that he says of the carpels "subhispidis." This character alone would seem to be almost sufficient to decide that it was not intended to refer to our plant. Knaf describes his plant as intermediate between *R. hederaceus* and *R. aquatilis*, distinguishing it from the latter by the leaves being all similar (*i.e.* none capillary), the stem rooting, and the time of flowering a month earlier; but he adds that it is perhaps only a variety of *R. aquatilis* with the leaves "conformibus." The distribution of our species (setting aside Knaf's Bohemian plant) is distinctly Western European, and the allied species *R. tripartitus* and *R. ololeucos* do not extend much farther eastward, so that it seems very improbable that it would occur in Bohemia. We are indebted to Herr Freyn for suggesting the identity of the British plant with *Batrachium lutarium*, Revel, which was described and figured in Act. Soc. Linn. Bord. 1834 (p. 413, pl. 4). Through the kindness of Mr. Charles Bailey we have had an opportunity of comparing our plant with specimens of *B. lutarium* from the original locality (La Teste, Gironde), and we feel satisfied that they are the same. Revel's species was, as far as we have ascertained, first placed in *Ranunculus* by Mons. Georges Bouvet, and M. Bouvet has kindly given us the reference to the original publication of the name in Bull. Soc. d'Etudes scient. d'Angers for 1873 (1874), p. 96. Our conclusion, therefore, is that the British plant should stand as *R. lutarius*, Bouvet; and of the two forms figured by Clavaud in Flor. de la Gironde (1882) it appears to correspond most nearly to the var. *intermedius* (p. 16, fig. 3), which has the lobes of the leaves more obtuse than in his var. *genuinus*.—H. & J. Groves.

Misuse of the Index Kewensis. — In the last volume of the *Transactions* of the New Zealand Institute, xxxi. 1898 (1899), from pages 404 to 415 there are five citations of *Gaya Lyallii* as of Hook. f. & Jacks. in various forms. This is a mistake, due to a misreading of the text of the *Index*, ii. 530, coupled with the unauthorized statement of the Clarendon Press on the back of each volume and part. The true citation is—*Gaya Lyallii* E. G. Baker in Journ. Bot. xxx. (1892), 137; syn. *Plagianthus Lyallii* Hook. f. ex Benth. in Journ. Linn. Soc. vi. (1862), 103; *Hoheria Lyallii* Hook. f. Fl. N. Z. i. 31, t. 11. When the genus *Plagianthus* came to be revised for press, Mr. E. G. Baker had reduced the species mentioned to *Gaya*, but at a date too late to be included in the *Index Kewensis;* all that could be done was to indicate its present position by appending "(Gayæ sp.)," which has been misinterpreted as shown above.—B. Daydon Jackson.

Drift Seeds.—There is an early notice of drift seeds in Pena & Lobel's *Adversaria* (1570), p. 395, where probably Lobel himself says: "Permultas accepimus à naucleris fabas Phasiolósve ex Americæ nouo orbe . . . . sed alias perquàm raras habemus nos,

munere lectissimæ, literata virtute & familia in Anglia illustri, Heroinæ Catherinæ Killigrææ quas ferunt repertas magna copia ad Cornubiæ littora, & quod non parum mirum, eo loco nullam meminit vllus nauem illisam, nullúmve naufragium factum : & tamen quotannis nouæ inueniuntur, partim fluitantes & partim effodiuntur immersæ sabulis littoreis, quasi, vt putant Cornubiensis maris Anglici accolæ, secundis Austris, aut Zephyris è nouo mundo appulsæ fuerint." Lady Catherine Killegrew was the fourth daughter of Sir Anthony Coke, of Arwenack, Cornwall, and the first wife of Sir Henry Killegrew; she is described as being proficient in Hebrew, Greek, and Latin. The earliest account of drift seeds in the botanic portion of the Voyage of the 'Challenger' is that of Sloane, 1696, and the next in *Amoenitates Academicæ*, vii. 477, resp. Tonning, the thesis being dated 1765. Mr. Hemsley, to whom I have shown the above-cited passage, is of opinion that it constitutes the earliest record of such occurrences. — B. Daydon Jackson.

SOME ALGOLOGICAL LITERATURE OF 1899.

(Concluded from p. 98.)

The *Bulletin of the Torrey Botanical Club* publishes some "Observations on *Nereocystis*," by Prof. Conway MacMillan. He describes the various parts of the plant from the young stages up to maturity, and compares some of his results with those of Profs. Wille and F. W. Oliver. He agrees with Prof. Oliver in regarding the trumpet-shaped hyphæ and the sieve-tubes as "separate structural elements not to be confused on account of their similar perforated end-plates." He notes that in young material the sieve-tubes are abundant, while in other plants they disappear, and the hyphæ abound. The author has seen no branching of the sieve-tubes as described by Prof. Oliver for *Nereocystis*, though this occurs in the trumpet-shaped hyphæ. Cryptostomata are found only on the young plant, where they are present on both stipe and lamina. They "appear as short irregular furrows, from the surface of which tufts of two- or three-celled hairs are produced." Each furrow lies over a mucilage canal, and on parts of the plant where no mucilage canal exists there is no furrow. Prof. MacMillan suggests that the mucilage canals are closed-in furrows, and that the so-called cryptostomata are but stages in this development. There appears, however, to be a strong resemblance between the description of these furrows and those of *Postelsia* and *Macrocystis*, described in Murray's *Phyc. Mem.* pt. iii. p. 84, 1895. Here the furrows are lined with sporangia and paraphyses, which do not grow on the ridges; thus obtaining almost as much shelter as if they were inside a conceptacle. It is not stated if in these plants there is a connection between the furrows and the mucilage canals.

Minnesota Botanical Studies, ser. 2, pt. iii. (Dec.), contains two papers on algæ—"Observations on *Chlorochytrium*," by E. M.

Freeman, and "Observations on *Rhodymenia*," by F. K. Butters. Mr. Freeman sums up our knowledge of *Chlorochytrium*, and describes an endophytic alga in *Constantinea sitchensis*, which he regards as *C. inclusum* Kjellm. The absence of reproductive bodies and the abundance of small cells leads him to suppose that this is a young state of the plant, and he compares it with specimens of *C. inclusum* found upon *Dilsea* in *Phycotheka Boreali-Americana*, fasc. xi. no. 514. These he regards as possibly a resting-stage of the plant, the more so as they were collected in December, while his plants were gathered in the summer months. He then explains the differences between the two forms. "Observations on *Rhodymenia*" were apparently worked out on *R. pertusa*, though, as this is not directly stated, it can only be inferred. The paper contains no point of special interest.

The *Annals of Botany* for March contains a paper on *Harveyella mirabilis* by Mr. Sturch. The author has studied this parasite from its earliest growth, and is of opinion that *Choreocolax albus* Kuck. is merely the tetraspore-bearing form of *Harveyella*. He describes the formation of antheridia, cystocarps, and tetraspores, and figures the various stages. Till now the antheridia have always been described as occurring on small flat fronds, but Mr. Sturch finds the antheridial thallus is "frequently as large and spherical as the mature cystocarpic fronds." Though the vegetative filaments inside the host appear to grow only between the walls of the host-cells, the author has seen "distinct protoplasmic threads connecting the cell-contents of these filaments with the cell-contents of the *Rhodomela*." This result was attained by staining glycerin-material with Hoffman's blue. Thus the cell-contents of the host are gradually absorbed, after having been surrounded by the parasitic filaments. As the result of his investigations, the author removes the genus *Harveyella* from *Gelidiaceæ* and places it in *Gigartinaceæ*, owing to the development of its auxiliary cell before fertilization; at the same time transferring *Choreocolax* provisionally to the same order. A key is given to the subdivisions of *Gigartinaceæ*, and, finally, the question of temperature is dealt with in connection with the seasonal appearance of *Harveyella*.

Dr. O. V. Darbishire continues the account of his investigations on *Actinococcus* in a paper "On *Actinococcus* and *Phyllophora*" published in the *Annals of Botany* for June. The result of his previous work on this subject had led him to believe that the nemathecia found on *Phyllophora Brodiæi* were the true tetrasporic fructification of that plant. Prof. Schmitz held the opposite view, in which he was supported by Dr. Gomont. Prof. Schmitz was, however, unable to prove his point, owing to his untimely death; but the work has been completely carried out by Dr. Darbishire, with the result that he abandons his former position, and justifies the hitherto unproved but correct view of Prof. Schmitz. It appears that on germination the parasitic *Actinococcus* produces a small "heap of perhaps 4–8 cells, one of which always comes to be near an ostiole leading to an antheridial cavity" of the host, *Phyllophora Brodiæi*. A filament

from this knot of cells grows down by this ostiole into the host plant, where it branches; some filaments shooting upwards towards the cortex, while others remain in the host and continue to force their way between the cells. Though the filaments do not actually enter the host-cells, they become in some way connected with them, since they extract the starch contained in the medulla of *Phyllophora*, and derive from it their chief nourishment. Those filaments which shoot up through the host-cortex to form the nemathecium pass quite easily through the outer layer of the host, though the germinating filament is unable to do so, and is forced to enter by means of the antheridial ostiole. Dr. Darbishire says that the exit of the parasitic filament seems to affect the surrounding tissue, giving an appearance of corrosion.

Since the tetraspores ripen in December and January, and are discharged soon after, the pertinent question is asked, what becomes of these spores till the time comes for fresh attacks on the host plant in the following autumn? The author suggests that this is an asexual form, which gives rise to a sexual plant on another host, and that the germinating spore of *Actinococcus*, as we know it, may be the carpospore. This sounds a more probable suggestion than that of Prof. Reinke here given, that *Actinococcus* is the asexual generation of *Phyllophora Brodiæi*, growing parasitically on it. Dr. Darbishire has succeeded in germinating the tetraspores of *Actinococcus*, but, though the cells lived for two years, no light appears to have been thrown on the points at issue. The author is about to examine other species of this genus, and his results are promised later. The paper ends with a diagnosis of the genus *Actinococcus* and the species *A. subcutaneus* (= *A. roseus* Kütz.).

"Notes on *Thorea*," by G. C. Hedgcock and A. A. Hunter, in *Botanical Gazette* (Dec.), p. 425, records the occurrence of *Thorea ramosissima* Bory in Nebraska. It had been previously found in Illinois, Florida, and Texas, so this new record is not surprising. The authors describe their plant, and figure a section with hairs and fruit. The branching appears to be more sparing, the colour is olive-brown rather than purple, and the hairs show points of difference from other records; but in the main the Nebraska plants agree with the published descriptions of the species.

The *Bulletin of the Torrey Botanical Club* (Jan.) gives short notes on "Four Siphoneous Algæ of the Pacific Coast," by Prof. De Alton Saunders. *Codium mucronatum* var. *californicum* J. Ag. is compared with *Codium tomentosum* Stackh., and the peripheral filaments of each species are figured side by side. Prof. Saunders evidently does not believe in the presence of a mucronate tip in some of the cells of *C. tomentosum*, although it has been asserted that the two forms of cell grow on the same plant. There are, however, differences in the length and general form of the peripheral cells in these two species, and the question as to the specific value of the mucronate point should be easily decided. *Codium adhærens* Ag. is recorded from Monterey. *Valonia ovalis* Ag.—or, as it should be called, *Halicystis ovalis* Schmitz—is here recorded for the first

time from the Pacific. In giving the distribution of this alga Prof. Saunders omits Scotland, where it was found in 1892 by Prof. Schmitz and Mr. George Murray, but possibly he regards the "North Atlantic" as including the Kyles of Bute! Mr. Murray sets forth Prof. Schmitz's views on the systematic position of *Halicystis* in a paper in *Phyc. Mem.* pt. ii. p. 47, 1893, where the minute structure of this genus is compared with that of *Valonia*. Prof. Schmitz goes so far as to separate *Halicystis* from the *Siphonocladaceæ* and place it in *Siphoneæ* on the grounds of vegetative characters; and it may safely be surmised that the finding of the reproductive organs of *Halicystis* will only confirm Prof. Schmitz's view. *Derbesia vaucheriæformis* J. Ag. has been found at Point Lobos. ten miles south of Monterey Bay; and, except that the Pacific plant is smaller, it agrees in all respects with the Atlantic plant of Prof. Farlow (*Mar. Alg. New Engl.* p. 60).

"Cladophora-Studien," by Dr. F. Brand, in *Bot. Centralblatt*, Bd. lxxix. no. 5 *et seq.* 1899, embodies the result of the author's work during several years on this much-entangled genus. Dr. Brand begins by pointing out the hopeless confusion which has arisen in the identification of species, owing to the contradictory diagnoses given by various authors. Reference to herbarium specimens is equally misleading, and types are far to seek. A paper such as this by Dr. Brand is a boon to systematic workers, if only by indicating stable points of comparison between subgenera and species. For the preparation of a type for examination he recommends the Lagerheim method as described in *Hedwigia*, 1888, p. 58. As a rule, however, unless haste be required. he prefers to lay the *Cladophora* for twenty-four hours or more in distilled water, with a few drops of dilute acetic acid. For staining purposes acetic methyl-green is said to be the best reagent, as working specially well on *Cladophoraceæ*. Dr. Brand divides his paper under the following headings:—"Physiological and biological conditions"; "Formation of the *Cladopora* thallus and the law of evection"; "Attachment, and formation of zoospores"; "Inner structure"; "Various accidental peculiarities"; "Points of diagnostic importance"; "Systematic views." Then follows a "Synopsis of the South Bavarian species of *Cladophora*," in which each species is described in its various states at different times of year. The description of these various conditions of one species under different specific names has led to much confusion, and it is only by such careful study as Dr. Brand has given to the subject that these errors can be rectified. It has been a difficult task to decide which points of difference are sufficiently stable to form a sound basis for specific distinction; but Dr. Brand has done this, and gives as such: "the general habit of the plant, as regards its growth in the form of a loose network, a closely packed layer, a tuft or in a ball; its maximum growth; but, above all, the presence or absence of a basal attachment or apical rhizoids; the variety of branching with special regard to the time of evection; the relative preponderance of apical or intercalary growth; the maximum thickness of the main stem and the minimum thickness of the branches, leaving isolated exceptions out of

consideration; the characteristic form of the vegetative cells; the conditions of reproduction and propagation; the presence or absence of zoospore formation or of stolons; the form of the resting-cells and of the sporangia." These points do not all show the same degree of stability, but can be regarded as possessing more or less worth as diagnostic characteristics. Relative length of the cells is denounced as quite worthless in this respect, and much of the present confusion in the genus arises from its use by the older writers. The creation of a new term "evection" is to be regretted, and indeed it seems to be almost unnecessary. It is intended to describe the manner in which the side branches issue from the upper part of the cell in the main stem and the consequent alteration in the angle of that cell wall. The author regards the varieties of evection in *Cladophora* as of importance from a systematic point of view. The result of this study of the genus from a broad standpoint is of such assistance towards understanding the few species which inhabit South Bavaria, that it is to be hoped the author will enlarge his borders and monograph at least the European species, if not the entire genus. Such is the confusion, however, reigning in *Cladophora* that an extra lease of life might be necessary for the task.

"Ueber Caulerpa: Ein Beitrag zur Biologie der Meeres-Organismen," by Prof. Reinke (*Wissensch. Meeresuntersuch. Kommission Kiel* neue Folge, Bd. 5, Heft 1, 25 Nov. 1899), is a somewhat speculative but interesting treatise from the biological point of view. In the introduction the author discusses the views of previous writers, and regrets that among the collectors and students of this genus so little attention has been paid to the mode of life and general conditions of the separate species. Even the depths to which they may grow have not been determined, with the exception of *C. prolifera*, and much has yet to be done in this line of investigation.

Prof. Reinke divides his paper into four sections. 1. A comparative review of the species of *Caulerpa*. 2. The question of the grouping of the species. 3. The morphological structure of *Caulerpa*. 4. Factors governing the external form.

In the first section, descriptions are given of thirty-seven of the fifty existing species, accompanied by new and excellent drawings, both natural size and magnified. In the main the same lines are followed as those laid down by Prof. Agardh and Madame Weber van Bosse, whose admirable monograph, published in 1898, forms the groundwork of all systematic study of this genus. The second section, which deals with the grouping of the various species, is full of interest. The author starts with the premise that *Caulerpa* and other allied genera possess a common ancestor which first gave rise to such forms as *Caulerpa fastigiata*, *Bryopsis duplex*, and *Derbesia*. As he justly observes, such a premise can neither be proved nor refuted, and is at least useful as forming a starting point for the division of the genus into natural groups. For a phylogenetic study of plants or animals three sources of information have to be taken into account—namely, palæontology, geographical distribution, and comparative morphology. In the case of *Caulerpa*,

the first two are practically useless, and thus the sole guide is to be found in a study of the present forms. On this basis Prof. Reinke divides the genus into nine groups, and draws up a series of tables showing the manner in which each group has branched off from existing groups. He also gives a similar table of the species in each group, the gaps which necessarily exist being filled in by a "Zwischenform" to denominate the lost link. The main difference between the grouping in these tables, and the division of the genus adopted by Prof. Agardh and Madame Weber van Bosse, appears to lie in the importance with which Prof. Reinke regards the presence or absence of small scaly leaf-like appendages on the rhizome of some species. Such as have these appendages are placed in a group by themselves, instead of being allied with other species which they resemble in other points.

"The structure of *Caulerpa*" begins with a short introduction, wherein the author remarks that almost all the known types of assimilatory organs are represented in *Caulerpa*, except *Marchantia*, *Riccia*, *Pellia*, *Parmelia*, or any plant of that type. The structure of the genus is dealt with under the headings of the rhizome; the roots; the assimilatory organs; growing point; differentiation of internal structure; adaptation in relation to variation in form; reproduction. Under this last heading the author gives as his opinion that the present forms of *Caulerpa* are aposporous, but are descended from forms which were reproduced by spores; and, if this view is adopted, endless questions arise which would be of interest did they permit of an answer. Unfortunately, such enquiry as is raised by Prof. Reinke must remain in the realm of speculation, and his questions, as he frankly admits, allow of no trustworthy answers. The final section, "Factors governing the external form," is divided under four heads: 1. "Dominants" (Dominanten) and morphological equilibrium. 2. The conditions (Bedingungen) of the forms. 3. Regeneration, Heredity, Variation. 4. Retrospect and Prospect.

ETHEL S. BARTON.

NOTICES OF BOOKS.

TWO COLONIAL FLORAS.

The Students' Flora of New Zealand and the adjoining Islands. By THOMAS KIRK, F.L.S. John Mackay, Wellington, N.Z. Eyre & Spottiswoode, London. [1899.]

The Queensland Flora. By F. MANSON BAILEY, F.L.S., Colonial Botanist of Queensland. Part i. *Ranunculaceæ—Anacardiaceæ.* Published under the authority of the Queensland Government. Brisbane. 1899. 8vo, boards, pp. xxxii, 325, x; 12 plates. Price 5s.

WE ought to have noticed sooner this instalment—for, although no indication of the fact appears on title-page or cover, it is only an instalment—of the important work to which Thomas Kirk

devoted the last years of his life, and which was to include, in a handy form, the results of his many years' investigations into New Zealand botany, in addition to the researches of previous workers. Since the publication of Sir Joseph Hooker's excellent *Handbook* in 1864, our knowledge of the New Zealand Flora has been greatly extended: the genus *Ranunculus*, for example, which was then represented by 20 species, now numbers 38 indigenous and 5 naturalized species; *Celmisia*, which is practically endemic, has extended its numbers from 24 to 39, *Coprosoma* from 24 to 40, and so in proportion. It was therefore in every way desirable that the history of New Zealand plants should be brought up to date, and Mr. Kirk was manifestly the man to undertake the task.

Unfortunately, however, Mr. Kirk's death not only prevented the completion of his work, but deprived us of the introductory matter on distribution, history, and the like, with which he had intended to preface the volume. We learn from the oddly worded and anonymous "introductory notice" prefixed to the present instalment that "the Government have in view the necessity for making arrangements for the completion of the work"; but this does not encourage us to hope for a very speedy conclusion. Unless such conclusion is promptly taken in hand, it will be relatively as disproportionate to the earlier part of the book as the later volumes of our African Floras prepared at Kew are to the earlier ones published a quarter of a century or so before.

The introduction acknowledges the help afforded by the Trustees of the British Museum, who sent for the purposes of this Flora complete sets of the plants collected by Banks and Solander (with a transcript of Solander's MS. *Floræ Novæ Zelandiæ*, which is not mentioned), and allowed a set of impressions to be taken from the copper plates prepared for Banks. These will be reproduced in a separate volume, which, however, will not interfere with the complete series of the Banksian plates which the Trustees will shortly begin to publish. It is matter for regret that Mr. Kirk has quoted throughout the MS. names employed in the Flora, thus adding to synonymy a number of entirely useless names of which future monographers will have to take note. It need hardly be said that in the official publication of the Banksian plates every care will be taken to avoid putting into circulation such unnecessary synonymy. It may however be remarked that a larger number of such names is already in print than might be assumed from the *Index Kewensis*, in which no note is taken of those published in Gaertner's *De Fructibus*. It is even less easy to understand why Mr. Kirk cited certain MS. names of his own as synonyms: we can only suppose that specimens have been distributed under these names which have since been identified with known species, and that they are printed here for the convenience of those who may possess such distributed examples. In any case, however, the printing of MS. names as synonyms is much to be deprecated.

A noteworthy feature in the book is the large proportion of naturalized species. In *Hypericum*, for example, in addition to the native *H. gramineum* and *H. japonicum*, *H. humifusum*, *H. perforatum*,

and *H. Androsæmum* are entered as naturalized in many localities; 13 species of *Trifolium*, 5 species of *Malva*, and 6 of *Vicia*, all introductions, represent these genera; in *Cruciferæ* there are 14 introduced as against 7 native genera, which include 30 introduced as against 22 native species. A considerable number of novelties are described —among them a genus, *Huttonella*, separated from *Carmichaelia* on account of its indehiscent pods, and including four species formerly placed in the last-named genus.

The book is well and carefully printed. Here and there—*e. g.* under *Brachycome lineata* (p. 259)—are indications that the editor, who is nowhere named, is not fully competent for his task, but on the whole he has done his work well, and has given an extremely full and useful index, which, however, is marred by the fact that the italics which indicate synonyms are confined to the names of species, generic synonyms being printed in ordinary type. The most serious omission is that of any indication, either on cover or title-page, that the work is incomplete: this defect is seriously misleading, and ought at once to be remedied in the interests of the public, who will hardly expect that a work claiming to be a "Flora of New Zealand" includes only the Polypetalæ and part of the Monopetalæ. Nor is there any date on the title-page; the preface is dated 10th April, 1899, but the book was not received in London until the beginning of October.

What Kirk did for New Zealand, Mr. F. M. Bailey is doing for Queensland, and a comparison of this first instalment of what is certain to be a useful work with the *Flora Australiensis* shows that our knowledge of Queensland botany during the last thirty years has extended almost as rapidly as that of New Zealand. Thus, for example, the genus *Nymphæa*, represented in Bentham's work by one species, here numbers five. About one of them, *N. Brownii*, here first described, we shall have something to say at a later date; another, *N. flava*, originally introduced from Florida, has become completely naturalized in one locality. Naturalized plants, however, are by no means conspicuously in evidence, and in this the Queensland Flora contrasts strikingly with that previously noticed.

Mr. Bailey has, no doubt wisely from the point of view of convenience, followed Bentham in arrangement and nomenclature, and, perhaps with less reason, has reproduced in full the descriptions from the Flora, "with any needful further descriptive notes which may have come to our knowledge since." Bentham of course worked entirely from herbarium specimens, and we think it would have been well if Mr. Bailey had availed himself of his opportunities to write descriptions from living plants. He has added useful information as to the economic properties of the trees, and the native names, which do not appear to be numerous. By the way, some of Mr. Bailey's own names are open to criticism on the ground of construction—"*Asterolasia Woombye* (found at Woombye)" for example, and "*Melicope chooreechillum* (native name of Mount Bartle Frere)." The excellent index deserves a word of commendation; the plates are useful, but their execution leaves something to be desired.

A few instances of oversight occur: thus Bentham is followed in his records of *Triumfetta procumbens*, and Mr. Hemsley's paper in this Journal for 1890, in which he took Solander's hitherto unpublished name (*T. subpalmata*) for the more frequent Queensland plant and established it as a species, is not referred to. For the most part, however, such omissions as we have noticed are due to the incompleteness of Bentham's investigation of the National Herbarium when he was engaged on the *Flora Australiensis*; e.g.

Polygala stenoclada var. *stenosepala* and *Cosmia* (*Calandrinia*) *quadrivalvis*, both of which were collected by Banks and Solander at Endeavour's River, are not recorded in Mr. Bailey's Flora. In the same way and for the same reason, a good many plants found by Banks are not mentioned as having been collected by him. It is interesting to note that certain of the discoveries of these early investigators, such as *Hibbertia Banksii* and *Polygala rhinanthoides*, are not recorded from any other collectors. In very numerous instances, too, Bentham attributes to Brown plants which were only collected by Banks and Solander, and in this Mr. Bailey, as was indeed inevitable under the circumstances, followed him: this is the case with *Boronia alulata* and *Eriostemon Banksii*.

It would, we think, have been well if the actual date of publication had been given. The title-page bears date 1899, and the preface is dated December of that year. Experience shows that an indication of this kind often stands for the following January, and although the new species described in the work are not numerous, it behoves every systematist to do his utmost to avoid adding to the confusion which already exists owing to want of care in such details.

We hope Mr. Bailey will lose no time in pushing towards a conclusion this useful contribution to the knowledge of the botany of our colonies.

We take the present opportunity of giving a portrait of Thomas Kirk, which did not arrive in time to accompany our notice of him in this Journal for December, 1898.

Dr. D. H. Scott's Recent Memoirs.

On Cheirostrobus, a New Type of Fossil Cone from the Lower Carboniferous Strata. Phil. Trans. clxxxix. pp. 1–34, pl. 1–6. 1897.

On Spencerites, a New Genus of Lycopodiaceous Cones from the Coal Measures, founded on the Lepidodendron Spenceri. Phil. Trans. clxxxix. pp. 83–106, pl. 12–15. 1897.

On Medullosa anglica, a New Representative of the Cycadofilices. Phil. Trans. cxci. pp. 88–126, pl. 5–13. 1899.

We congratulate Dr. Scott on the interesting points which he describes and expounds in these three papers. Working as collaborator with the late Prof. Williamson in the last memoirs he contributed to the *Philosophical Transactions*, he has now taken up the work by himself, and the first fruits of his independent labours we have in these three memoirs.

The first deals with a novelty from one of those strange masses of vegetable matter enclosed in the trappean tufa at Pettycur, Fifeshire, which have supplied several interesting forms to the Carboniferous flora. *Cheirostrobus* is a cone in which the twelve sporophylls are arranged in superposed whorls. The sporophylls are divided horizontally into upper and lower laminæ, and laterally into three segments. The lower lamina is foliaceous, passes out at a right angle to the axis, and the ascending apices cover the tips of the upper lamina, which bear on each of its three divisions the sporangia. The spores are uniform in size. Dr. Scott carefully discusses the affinities of this remarkable cone. In most respects it accords more with the palæozoic *Equisetaceæ*, and is probably, as the author suggests, nearest to *Sphenophyllum*. Its relation to *Bornia*, with its superposed verticils and its much-divided leaves, deserves more consideration, but unfortunately specimens of this early type of *Equisetaceæ* have not been found with the structure preserved so as to enable a satisfactory comparison to be made.

The second memoir deals with a cone previously described as a *Lepidostrobus* by Williamson, but possessing characters which Dr. Scott considers indicate a new generic type, to which he gives the

name *Spencerites*. The sporangia of the cones included in *Lepidostrobus* are attached to the upper surface of the pedicel of the bract, whereas in the cone he describes they are free from the pedicel, and attached by a narrow base to the upper surface of the lamina.

The remaining memoir is devoted to the minute structure of the stem, leaf-bases, and roots of a singular fossil from the Lower Coal Measures of Stalybridge, Lancashire, belonging to the genus *Medullosa*, to which Dr. Scott gives the name of *M. anglica*. The specimens described are beautifully preserved, and are expounded by the author in full and careful detail, which add considerably to the knowledge of the genus. No fruit has yet been detected that can be referred to any of the stems included in *Medullosa*. The vegetative structures, so far as known, present characters which seem to indicate affinities with Ferns and Cycads, and for them, and some other very different fossils, Potonié suggested the name *Cycadofilices*. They are set forth as representing a stage in the evolution of Cycads and Ferns. Is it not a new notion to find combined in a generalised ancestor the structures which are specialised in two later and very distinct groups? It is difficult to conceive a parent for the benefit of its progeny breaking up its body into its constituent parts, so that the "Cycado" elements should belong to one group of offspring exclusively, and the "filices" elements should be handed over to another group. This is not the way that the genetic history of plants has hitherto been supposed to have proceeded.

W. C.

Note.

Mr. Williams Hervey, whose *Observations on the Colors of Flowers* was reviewed on pp. 53, 54, writes to complain that we have altogether misunderstood him, and represented him as maintaining the exact opposite of his actual doctrine by crediting him with the theory that the stimulation of insects produces *new* colours on a blossom, whereas he holds and teaches that it causes the original colour to survive, while the hue of unstimulated portions of the flower is changed by "Nature"; and, in proof that this is so, he cites various passages from the treatise in question.

So far as we may have misrepresented him, we willingly express our regret; but, as another journal—the *Gardeners' Chronicle*—misconstrued his meaning in much the same fashion as ourselves, we cannot but think that the author failed to set forth his theses with perfect perspicuity.

Moreover, looking at his book afresh in the light of his recent explanations—although we undoubtedly find various instances cited in which he claims that bees have perpetuated the original colour in certain parts, whilst "Nature" transformed it elsewhere—we find some to which it is hard to suppose that such an account of the matter is intended to apply; while certainly the style of language employed may not unnaturally lead even a careful reader to gather that something more than mere conservation of colour is ascribed to insect agency. Thus we are told (p. 74)—(the italics are ours)—"Figuratively speaking, the special markings on the petals of flowers

are the footprints of the bees and butterflies. When they follow the same route for nectar, they leave a trail; where the butterflies walk around the stamens of a pink they leave the impression of their tiny feet in the shape of a circle; when a bee rubs his back against the petals of a poppy he makes a similar shaped spot on each; and when with his tongue he laps the nectar of the tulip tree, he *paints* a golden band; when he falls to the bottom of the cup-shaped tulip, he in his scrambling *describes a disc* of blue or yellow."

It is still more confusing to find [p. 68] that in the Kaiser Crown tulip, while the insects have produced a golden circle inside, "Nature" was laying on the same colour without, but vertically instead of horizontally, and that in the tulip-tree itself the gold was a "new" colour.

All this, however, is of comparatively minor significance. We ventured to intimate our total disbelief in Mr. Hervey's explanation of the production of colour whether by perpetuation or alteration—asking how it came about that all bees and butterflies should have trodden so precisely on the same spots as to have left footprints or tracks, when there was no special advantage to be gained by so doing; and indeed how an insect with six sprawling feet could possibly walk along a line as fine as a hair, as, according to this theory, he must constantly have done.

J. G.

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*ARTICLES IN JOURNALS.**

Bot. Centralblatt (Nos. 9–12).—K. Müller, 'Zusammenstellung der Lebermoose aus dem Reichslande Elsass-Lothringen.'—(No. 10). O. Kuntze, '*Spirodiscus, Ophiothrix, Ophiocytium:* ein Nomenclatur-Beitrag.'—(No. 11). S. Rostowzew, 'Ein Laboratoriumstisch für das Mikroskopiren.'

Bot. Gazette (20 Feb.). — B. M. Duggar, 'Development of the pollen grain in *Symplocarpus fœtidus* and *Peltandra undulata*' (2 plates).—W. D. Merrell, 'Life history of *Silphium*' (8 plates).—E. J. Hill, '*Cerastium arvense* var. *oblongifolium*.' — A. Nelson, *Viola erectifolia*, sp. n.

Bot. Magazine (Tokio: 20 Jan., received 20 March).—J. Matsumura, *Owataria* (n. gen., Guttiferæ). —K. Okamura, '*Microcladia & Carpoblepharis*' (1 plate). — T. Makino, 'Plantæ Japonenses' (*Arundinaria quadrangularis*) (cont.).

Bot. Zeitung (16 March).—F. Kuhla, 'Die Plasmaverbindungen bei *Viscum album*, mit Berücksichtigung des Siebröhrensystemes von *Cucurbita Pepo*' (1 pl.).

Bull. Torrey Bot. Club (17 Feb.).—J. B. Ellis & B. M. Everhardt, 'New Fungi' (*Echinodontium*, gen. nov. (*Hydnaceæ*)). — T. Holm, Plants of Baffin's Land.—H. H. Rusby, S. American Plants (cont.).

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* The dates assigned to the numbers are those which appear on their covers or title-pages, but it must not always be inferred that this is the actual date of publication.

— W. J. Beal, 'Monstrosities in *Eragrostis* & *Setaria*.' — T. D. A. Cockerell, 'South Western Plants.'

Gardeners' Chronicle (10 March). — *Zygopetalum Ballii*, sp. n. (fig. 47).

Journal de Botanique (Feb.: received 14 March).—E. G. Camus, 'Plantes hybrides spontanées de la flore européenne' (cont.).—P. Van Tieghem, 'Bixacées, Cochlospermacées, et Sphérosépalacées.'

Mémoires de l'Herb. Boissier (No. 7: 20 Feb.).—L. Chevallier, 'Notes sur la Flore du Sahara.' — (No. 8: 28 Feb.). A. Chabert, 'Les *Rhinanthus* des Alpes Maritimes.' — (No. 9: 2 March). E. Rosenstock, '*Aspidium libanoticum*, sp. n.'

Nuovo Giorn. Bot. Ital. (Jan.: received 10 March).—J. Baldrati, 'Appunti di Cecidiologia' (6 plates). — L. Paolucci & F. Cardinali, 'Secondo contributo alla Flora Marchigiana.'

Oesterr. Bot. Zeitschrift (March).—S. Provazek, '*Synedra hyalina*, eine apochlorische Bacillarie.' — W. Figdor, 'Zur Anatomie des Stammes der Dammarpflanze.' — C. Rechinger, 'Ueber *Lamium Orvala* und *L. Wettsteinii*.'—A. Jenčič, 'Untersuchungen des Pollens hybrider Pflanzen' (concl.). — J. M. Polak, 'Untersuchungen über die Staminodien der Scrophulariaceen' (cont.). — J. Bornmüller, *Sideritis curvidens* Stapf.—J. B. Scholz, 'Studien über *Chenopodium opulifolium*' (cont.).

BOOK-NOTES, NEWS, &c.

Prof. Conway Macmillan has published a handsome and interesting volume on *Minnesota Plant Life* (Pioneer Press, St. Paul, Minnesota) which forms the third of the "Botanical Series" of the "Report of the Survey." The author has aimed at being at once popular and scientific, and although such a combination is proverbially difficult of attainment, he may be said to have succeeded. The attractiveness of the volume is largely due to the admirable illustrations, which, to the number of nearly two hundred and fifty, are scattered through the text. Many of these, from photographs, are of extreme beauty, and represent certain aspects of vegetation with an accuracy and suggestiveness which could be obtained by no other method; they almost reconcile us to the heavy shiny paper which is presumably necessary for their satisfactory reproduction. In this return to the life-history of plants we welcome a reaction from the domination of the "pot and pan" school, which at one time threatened to usurp the whole range of botanical literature; it is now coming to be understood that some knowledge of a plant as a whole is not necessarily incompatible with an intimate acquaintance with the minute structure of some fragment of its entity. It remains to be said that Prof. Macmillan has produced a book which may be read with pleasure and profit by the reader of ordinary intelligence; and to suggest that, in spite of the extensive literature connected with British botany, there is yet room for a volume which should do for these islands what is here done for Minnesota.

We have received from Messrs. Griffin the third edition of *The Flowering Plant*, an introduction to Botany by Mr. J. R. Ainsworth Davis (price 3s. 6d.), the original issue of which was noticed at length in this Journal for 1890 (pp.189–91); the present differs but little, except in the addition of a chapter of ten pages, entitled "Ferns and Mosses," in which the whole of the Cryptogams are disposed of. The index seems as over-compendious as it was ten years ago. The book has not an attractive appearance, and there are several elementary text-books on botany published in this country, to say nothing of some recently issued in America, which we should recommend in preference.

At a meeting of the Linnean Society on Feb. 15th, Mr. R. Morton Middleton exhibited a series of specimens of *Asplenium Bradleyi* Eaton, one of the rarer rock ferns from Tennessee, to show its extreme variability. The simplest fronds exhibited were found in a damp, cold, perpendicular rift, which no sunshine could enter, at an elevation of about 1700 ft.: these fronds had the simple pinnate structure, with green rachis and rounded toothed pinnæ, of *A. viride* Hudson, but were more coriaceous than in that species. Dr. Gattinger, author of the Tennessee Flora, was satisfied that the plant was *A. viride;* and Gen. Kirby Smith, who had had ample opportunity of studying *A. Bradleyi* on the eastern slopes of the Cumberland plateau, remarked that *A. viride* and *A. Bradleyi* were so much alike that they might be varieties. The other plants exhibited, however, showed a gradual tendency to become more and more compound, culminating in a luxuriant specimen with pinnatifid fronds 10 in. long, the green rachis becoming purple and shining in all the plants exposed to the sun's rays. The affinities of so variable a fern are naturally of interest. Eaton remarked: "If there could be a hybrid between *A. ebeneum* and *A. montanum*, it would be much like our plant." Asa Gray, following Eaton, said, "Intermediate between *A. ebeneum* and *A. montanum*." Baker says, "Between *montanum* and *lanceolatum*." Mr. Middleton believed it to be very near to *A. viride*, and perhaps intermediate (though not a hybrid) between *A. viride* and *A. lanceolatum*. *A. viride*, identical with the species of Europe and Asia, is essentially boreal, and occurs in British America from New Brunswick to British Columbia, as well as in the State of Vermont. *A. Bradleyi* then takes its place, extending south from New York to Georgia and Alabama, and west to Arkansas. *A. lanceolatum* Huds. is not American at all, but is found in Europe, North Africa, and some of the Atlantic islands (Madeira, Azores, and St. Helena). The exhibitor did not consider that *A. Bradleyi* had any special affinity either with *A. montanum* or *A. ebeneum*, which are entirely American, except that the latter appears in Cape Colony. Britton and Brown, in their *Illustrated Flora*, state that *A. Bradleyi* prefers a limestone soil, but Mr. Middleton had found it strictly confined to sandstone, although the carboniferous limestone was immediately adjacent.

At the same meeting Mr. J. C. Shenstone exhibited a collection of seven hundred photographs of British Flowering Plants, to show what could be accomplished by means of the camera in the direction

of botanical illustration. He contended that photography was the only means by which the lines and masses of our flowering plants—as truly characteristic as the less subtle characters by means of which botanists group and arrange plants into orders, genera, and species—could be readily reproduced. He explained the various technical processes and apparatus necessary for successful plant photography, and alluded to the difficulties inseparable from the photography of plants in their natural habitats, &c. His remarks were illustrated by means of lantern-slides.

At the meeting of the Linnean Society on March 1st, Mr. C. B. Clarke read a paper on "Botanic Nomenclature." He showed that the new rule adopted at Berlin—not to disturb names that had fifty years' use on the ground of priority alone—resulted in a practical uniformity with the system of naming adopted by Mr. Bentham and Sir J. D. Hooker. The Old World, he said, had thus reached a fair general agreement in nomenclature. The American botanists follow a new system which aims at finality on a so-called "non-shifting basis" in which the genus or species, as the case may be, is established on a type-specimen. Mr. Clarke's paper was devoted mainly to showing by selected instances that this system did not ensure finality: that the errors in determining what should be ranked as the type are enough to discredit the system; and the author commented on the disputed question whether a plant should be given the oldest specific name bestowed upon it, or the oldest specific name it bears in the genus in which it is now placed.

Most of the points raised in Mr. Clarke's paper have been dealt with from time to time in this Journal, and it is therefore hardly necessary to discuss them. It has been shown more than once, and indeed is generally recognized, that Bentham and Hooker had no fixed "system" of nomenclature, beyond a general notion of "convenience." It is news to us that the regarding as types of a genus the specimens on which it was based is a recent American invention. That in certain cases—*e. g.* the Linnean herbarium—the specimens do not correspond with the descriptions is well known, and receives exceptional treatment. But if the specimens which the author of a genus had before him when he established it are not to be regarded as types of that genus, it is difficult to see—and Mr. Clarke does not tell us—what is to take their place. To take one example: the diagnoses published by Robert Brown, admirable as they are, and amply sufficient when written, are often very brief, and do not suffice for differentiation from the very numerous species discovered since his time; it is only by consulting the ample series of specimens preserved in his herbarium (now in the national collection) that "finality on a non-shifting basis" can be attained.

The death is recorded at an advanced age of Dr. Adolfo Ernst, for many years Director of the National Museum at Carácas, Venezuela. He contributed several papers to the earlier volumes of this Journal and to other botanical and natural history periodicals.

The *Gardeners' Chronicle* prints an account of a lecture recently delivered by Professor Johnson before the Royal Dublin Society which seems sufficiently remarkable to deserve reproduction. The subject was "Some Aspects of Modern Botany." "He pointed out that scientific botany was from several standpoints its least scientific aspect, and the classification of the British school of botanists was less scientific than their co-workers the Germans. From the point of view of the field botanist it was also dissimilar in which they found themselves. There is some hope that order may finally be expected owing to the labours of the editors of the *Index Kewensis*, &c. The subject of vegetable physiology was spoken to at length, and the early labours of R. Brown enumerated. Brown was one of those who helped to lay in Great Britain the foundation of modern vegetable physiology, and his labours in systematic botany were by no means meagre. In speaking of Tobacco culture, the Professor said that heavy nitrogenous manuring injured the flavour of Tobacco."

Mr. R. Lloyd Praeger hopes to publish, early in 1901, a work in which he proposes to show the distribution of flowering plants in Ireland in the forty divisions (counties or portions of counties) into which he divided the country in a paper published in 1896 in this Journal. The work is now sufficiently far advanced to show the deficiencies in each of the county lists. A number of common plants still remain unrecorded from all but a few counties, and plants of frequent occurrence are still wanted from almost every county. He will be grateful for any help towards the completion of the county lists, either with unpublished notes of plants observed in any part of Ireland, or by searching in any county for plants still unrecorded therefrom; and will furnish lists of such plants for any county. Information should be addressed to him at the National Library of Ireland, Dublin.

Dr. Gy de Istavanffi, Professor of Botany in the Royal University of Hungary, is publishing, under the title "Fungorum in Pannonium observatum Brevis Historia a Carolo Clusio Abrebate conscripta," a reissue of the water-colour drawings of fungi which were painted for Clusius, and printed by him with the text in 1601. The original plates are eighty-seven in number, and are now in the library of the State University of Leyden. The work is to be issued in ten parts, three of which have appeared; it is of great historical interest, and is beautifully executed. The fungi are divided into two series, of esculent and non-esculent genera; the local names, with details of size, colour, &c., are given, and should be of great aid in determining his species; but it is to be hoped that Professor Istavanffi will add a good index with the modern names.

Mr. W. A. Clarke has in the press a revised edition of his "First Records of British Flowering Plants."

The number just to hand of the *Anales del Instituto Médico Nacional* of Mexico (vol. iv. no. 7, dated July, 1899) contains an interesting article on "El Herbario de Berlandier," with an account of his travels, by Dr. G. V. Alcocer, the keeper of the herbarium of the Institute.

The Rev. E. F. Linton has now completed the manuscript of a Flora of Bournemouth, which he hopes to issue before the summer. Taking the same radius, of twelve miles, which the late Mr. T. R. A. Briggs adopted for his admirable *Flora of Plymouth*, Mr. Linton has divided the district so formed into five divisions, arranged as far as may be according to the watersheds. In order to fall in with the numbering of the *Flora of Hampshire*, parts of the first three districts of which lie within the twelve-mile radius, the Stour watershed is taken to form Div. 1, with a Dorset and a Hants subdivision; then Div. 2 is the south portion of the Avon watershed; and Div. 3 corresponds with a small part of Distr. III. of *Fl. Hants*. The remainder of the Bournemouth district, which lies in Dorset, embraces the whole of Poole Harbour and the best part of the Isle of Purbeck, and is separated into Div. 4 and Div. 5 by the line of the main street (running east and west) of Wareham, a clear and scientific boundary. The usual topics are discussed in introductory papers, and the floras of the two counties concerned are compared.

Edward Joseph Lowe, who was born at Highfield House, Nottinghamshire, on Nov. 11, 1825, died at Shirenewton Hall, near Chepstow, on the 10th of last month. He was interested in numerous branches of science, more especially in astronomy and botany, and was a Fellow of many scientific societies, including the Royal Society, to which he was elected in 1867, and the Linnean, which he joined in 1857. His principal work among plants was in the direction of hybridization, in which his experiments began in 1842. They were made on various groups of flowering plants—fuchsias, pansies, cactuses, and other popular florists' flowers; but the most important were those connected with the occurrence of hybridization among ferns—a discovery which, when described by Lowe at the meeting of the British Association in 1867, was generally discredited. He embodied the results of his numerous experiments in his book entitled *Fern Growing*, published in 1895, the frontispiece to which is an admirable portrait of the author. His collection of ferns was unique in the number and variety of the forms which it contained. Among Lowe's other publications may be mentioned *Ferns, British and Exotic*, a work in eight volumes (1855–60, reissued in 1872), in which his object was "to describe as faithfully as he was able the ferns cultivated in the gardens, greenhouses, and stoves of Great Britain," leaving the "deep study of the subject" to Hooker and Moore; *New and Rare Ferns*, "an addenda (*sic*) to the eight volumes," appeared in 1862. Two volumes on *Our Native Ferns*, noteworthy for the number of forms figured, appeared in 1867; and a *Natural History of British Grasses* in 1858.

The first part has been issued of *Genera Siphonogamarum ad Systema Englerianum conscripta*, by Drs. C. G. de Dalla Torre and H. Harms: we hope to notice it later.

Correction.—On p. 78 of our last issue, line 22 from top, the words "twenty-four in" should be inserted before "my own."

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JAMES BRITTEN, K.S.G., F.L.S.

SENIOR ASSISTANT, DEPARTMENT OF BOTANY, BRITISH MUSEUM (NATURAL HISTORY)

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The Journal of Botany was established in 1863 by Dr. Seemann. In 1872 the editorship was assumed by the late Dr. Trimen, who, assisted during part of the time by Mr. J. G. Baker and Mr. Spencer Moore, carried it on until the end of 1879, when he left England for Ceylon. Since then it has been in the hands of the present Editor.

Without professing to occupy the vast field of general Botany, the Journal has from its inception filled a position which, even now, is covered by no other periodical. It affords a ready and prompt medium for the publication of new discoveries, and appears regularly and punctually on the 1st of each month. While more especially concerned with systematic botany, observations of every kind are welcomed. Especial prominence has from the first been given to British botany, and it may safely be said that nothing of primary importance bearing upon this subject has remained unnoticed.

Bibliographical matters have also received and continue to receive considerable attention, and the history of many obscure publications has been elucidated. Every number contains reviews of new and important books written by competent critics: in this as in every other respect a strictly independent attitude has been maintained. While in no way officially connected with the Department of Botany of the British Museum, the Journal has from the first been controlled by those whose acquaintance with the National Herbarium has enabled them to utilize its pages for recording facts of interest and importance regarding the priceless botanical collections which the Museum contains. Many important monographs and other works first appeared in its pages. In 1896 it became necessary to increase its size, owing to the number of papers sent for publication: the number of plates was at the same time augmented.

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The bound volumes for 1896, 1897, 1898, and 1899 can be had at the usual price, £1 1s. each; also covers for the 1899 volume (price 1s. 4d. post free).

S Mo're del anal; R Morgan lith.

West, Newman imp.

A Stephanolepis centauroides: B Phæocephalus gnidioides.

ALABASTRA DIVERSA.—Part VI.

By Spencer Le M. Moore, F.L.S.

(Plates 409, 410.)

New Compositæ.

Gutenbergia araneosa, sp. nov. Fruticulosa, ramosa, foliosa, ramis albido-tomentosis dein pubescentibus, foliis oblongo-lanceolatis acutis margine undulatis supra araneosis subtus albide floccoso-tomentosis inferioribus breviter petiolatis superioribus cordato-amplexicaulibus, cymis eleganter corymbiformibus sat laxis 4–12-capitulatis, capitulis mediocribus circa 20-flosculosis, involucri phyllis exterioribus lanceolatis abbreviatis interioribus lanceolato-oblongis margine scariosis læte purpureis omnibus breviter spinuloso-acuminatis araneoso-pubescentibus, achæniis 4-gonis 4-costatis.

Hab. British East Africa, between Lé and Tocha, 1898; *Lord Delamere* (Herb. Mus. Brit.).

Folia 2·0–4·0 cm. long., 0·7–1·0 cm. lat., subtus nervosa. Cymæ 4·0–5·0 cm. diam. Pedicelli modici 0·6–1·0 cm. long., graciles, appresse pubescentes. Capitula 0·8 cm. diam. Involucri 0.5 cm. long. phylla extima 0·22 cm. long., interiora 0·4 cm. long., 0·12 cm. lat. Corollæ puberulæ in toto 0·7 cm. long. lobi lineares. Achænia 0·1–0·12 cm. long., fere omnino glabra.

In external appearance this is most like *G. Rüppellii* Sch. Bip. The chief peculiarities about it are the clothing of the leaves, the shape of the inner involucral scales, and the 4-costate achenes.

Stephanolepis

Compositarum e tribu Vernoniacearum genus novum (tab. 409).

Capitula homogama, multiflosculosa. Involucri late campanulati phylla pluriseriata, extima minora, inappendiculata, reliqua lamina scariosa erosa coronata. Receptaculum planum, alveolatum. Corolla stricte actinomorpha, sursum sensim angustata, 5-fida. Antheræ basi sagittatæ auriculis obtusis contiguis, apice connectivo lanceolato instructæ. Styli sursum incrassati rami lineari-subulati, hirtelli. Achænia parva, 4–5-gono-cylindrica, truncata, fere glabra. Pappus uniserialis, e setis circa 10 brevibus scabridis caducissimis compositus.—Suffrutex foliosus. Folia parva, alterna, membranacea, penninervia. Capitula solitaria, pedunculata, terminalia vel axillaria. Flosculi purpurei.

Stephanolepis centauroides, sp. unica. Caule sparsim ramoso usque at 15·0 cm. alt. pubescente demum puberulo, foliis subsessilibus oblanceolatis brevissime spinuloso-acuminatis margine dentato-undulatis pubescentibus mox scabriusculis in sicco viridibus usque ad 3·0 cm. long. et 1·0 cm. lat. plerisque vero 1·0–1·5 cm. long. et 0·3–0·4 cm. lat., pedunculis 2·0–3·0 cm. long. appresse pubescentibus, capitulis 1·0 cm. long. usque 1·5 cm. diam. circa 40-flosculosis, involucri 6-serialis phyllis extimis serr. 1 et 2 lanceolatis acuminatis illis 0·1–0·15 cm. long. his duplo longioribus, phyllis

interioribus oblongis 0·5 cm. long. lamina deltoideo-rotundata varie incisa vel lacerata onustis, corollæ in toto vix 1·0 cm. long. extus papilloso-puberulæ lobis 0·3 cm. long. lineari-oblongis apice extus echinulatis, achæniis pallide brunneis, 0·2 cm. long., 0·14 cm. lat., pappi setis 0·2–0·25 cm. long., albis.

Hab. Somaliland, Upper Sheik, 1897; *Mrs. Lort Phillips* (Herb. Mus. Brit.).

The affinity of the genus here proposed is undoubtedly with *Bothriocline*, which, with similar achenes, has yet a different inflorescence, involucre, and pappus. As regards its involucre, *Stephanolepis* shows an approach towards *Centratherum*, but in achene and pappus the two are quite different. The position proposed for *Stephanolepis* is next to *Bothriocline*.

The pappus is so extremely caducous as to render the exact numbering of the setæ a matter of great difficulty.

Vernonia (§ Lepidella) **Phillipsiæ**, sp. nov. Suffructicosa, ramosa, foliis parvis obovatis vel obovato-oblongis obtusis vel acutis integris vel utrinque semel dentato-lobulatis fere omnino glabris, capitulis submediocribus longipedunculatis campanulatis 10-flosculosis apicem versus sparsis, involucri circa 6-serialis phyllis extimis minimis ovato-lanceolatis una cum intermediis ovatis erecto-patentibus intimis ovato-oblongis intermedia bene excedentibus omnibus spinuloso-acuminatis (intimis potius mucronatis) et sursum purpureis et puberulis, achæniis hispidulis obscure 10-costatis, pappi straminei squamis lanceolatis abbreviatis setis scabriusculis.

Hab. Somaliland, Wagga Mountains, and above The Upper Sheik, 1897; *Mrs. Lort Phillips* (Herb. Mus. Brit.).

Folia circa 0·8 cm. long. et 0·4 cm. lat. (summa vero minora), coriaceo-membranacea, margine saltem in sicco revoluta, creberrime nigro-glandulosa. Capitula 1·0 cm. long., 0·8 cm. lat. Pedunculi 2·0–3·5 cm. long. Involucri phylla extima circa 0·2 cm. long.; intermedia circa 0·4 cm. et intima 0·6 cm. long. Flosculi 0·8 cm. long. Achænia 0·3 cm. long. Pappi squamæ 0·06 cm. long.; setæ achæniis duplo longiores.

This is very distinct from any species hitherto described. The small often lobulate leaves, the sparse heads on long peduncles, and the very short outer involucral scales are among its distinctive features.

Vernonia (§ Cyanopis) **Taylorii**, sp. nov. Fruticosa, sparsim ramosa, ramulis subteretibus minute pubescentibus, foliis brevipetiolatis oblongo-obovatis acutis crenato-dentatis basi cuneatis vel subpanduratis vel biauriculatis supra scabriusculis subtus albide vel subfulvide tomentellis, capitulis parvis circa 8-flosculosis in paniculis terminalibus sat densis minute pubescentibus folia subæquantibus digestis, involucri anguste campanulati circa 6-serialis phyllis (intimis lanceolatis elongatis exemptis) ovato-oblongis obtuse acutis laxe adpressis membranaceis ananeoso-ciliolatis, achæniis subturbinatis 4-costatis puberulis, pappi fulvidi setis exterioribus paucis interioribus scabridis.

Hab. Rabai Hills, Mombasa, 1885; *Rev. W. E. Taylor* (Herb. Mus. Brit.).

Folia modice 4·0–6·0 cm long., et 2·5 cm. lat., minora vero exstant nequaquam ultra 2·0 cm. long., microscopice glandulosa, membranacea; petioli circa 0·3 cm. long., pubescentes. Paniculi 4·0–5·0 cm. diam. Capitula 0·8 cm. long., 0·35 cm. lat. Involucri 0·45 cm. long. phylla extima 0·13 cm. long.; intermedia 0·25 cm. et intima 0·35 cm. long., phylla omnia aliquantulo carinata. Flosculi 0·7 cm. long. Achænia 0·2–0·25 cm. long. Pappi setæ interiores 0·6 cm. long.

The crenate-dentate leaves and close panicles of small heads, together with the tawny pappus, are the chief characteristics of this species.

Vernonia (§ Cyanopis) **Bellinghamii,** sp. nov. Fruticosa ramulis sat validis adpresse et subfulvide tomentellis maturitate glabris necnon eximie lenticelliferis, foliis breviter petiolatis ellipticis obtusis vel obtusissimis supra fere glabris et arcte reticulato-venosis subtus tomentosis, paniculis abbreviatis sc. foliis brevioribus dense subumbellatis, capitulis anguste cylindricis 4-flosculosis, involucri circa 6-serialis phyllis ovatis obtusis vel obtuse acutis arcte applicatis subscariosis araneoso-ciliolatis, achæniis glabris 3-costatis, pappi straminei setis exterioribus paucis interioribus scabridis.

Hab. Lukoma, Lake Nyassa, 1887; *Wm. Bellingham* (Herb. Mus. Brit.): Nyassaland, 1891; *Buchanan* (No. 1136 in Herbb. Mus. Brit. & Kew.—no. 1124 in Herb. Kew.): Portuguese East Africa; *Rev. Archdeacon Johnson* (No. 48 in Herb. Kew.).

Folia usque 7·0 cm. long. (modice vero 4·0–5·0 cm. long., et exstant multo minora) et 2·5–3·5 cm. lat., basi parum obliqua, margine minutissime serrulata vel integerrima, supra in sicco viridescentia. Paniculi 2·0–2·5 cm. diam. Capitula 1·2 cm. long. Involucri 0·8 cm. long. vix 0·3 cm. lat. phylla extima 0·15 cm., intermedia 0·3 cm., intima 0·6 cm. long. Flosculi 0·6 cm. long. Achænia turbinata, 0·25 cm. long., sursum 0·1 cm. lat.

Easily recognized by reason of the elliptical leaves tomentose below and the subumbellate masses of narrowly cylindrical 4-flowered capitula.

Vernonia (§ Cyanopis) **meiocalyx,** sp. nov. Fruticosa, caule gracili tereti minute tomentello, foliis amplis ovato-cordatis acuminatis margine acute dentatis denticulatisve basi in petiolum satis longum subito decurrentibus supra fere glabris subtus pubescentibus tenuiter membranaceis, capitulis parvis dense paniculatis circa 10-flosculosis, involucri abbreviati 4-serialis phyllis exterioribus linearilanceolatis interioribus ovato-lanceolatis omnibus breviter acuminatis dorso carinulatis margine araneoso-ciliolatis, achæniis cylindricis 6-costatis costis pubescentibus.

Hab. British East Africa, Cantalla and Hadda, also Elámo (4500 ft.), 1898; *Lord Delamere* (Herb. Mus. Brit.).

Caulis 0·2 cm. diam., ætate haud calvescens. Folia matura 10·0–12·0 cm. long., 5·0–8·0 cm lat.; petioli 1·5–2·0 cm. long., minute tomentelli. Paniculi 5·0–6·0 cm. diam. Involucri 0·3 cm. long. phylla viridescenti-subscariosa, exteriora 0·17 cm. long., intima 0·3 cm. long. et 0·1 cm. lat. Corolla 0·7 cm. long. Achænia

0·15 cm. long., 0·06 cm. lat. Pappi setæ exteriores paucæ, interiores 0·4 cm. long., scabriusculæ, purpureæ vel albescentes.

In external appearance this is very like *V. brachycalyx* O. Hoffm., which, besides being a member of § *Lepidella*, has different leaves, somewhat larger heads, with broader involucral scales, and longer, turbinate, few-ribbed, nearly glabrous achenes. Dr. Hoffmann refers to his *V. brachycalyx* Hildebrandt's No. 2466, a plant with its outer pappus of setæ not of scales, and therefore not referable to § *Lepidella*. This is exceedingly near *V. meiocalyx*, but its leaves are much smaller and differently shaped, the involucral scales are somewhat broader, and the turbinate achenes are more like those of *V. brachycalyx*. I propose to distinguish this as *V. Hoffmanniana*.

Pteronia decumbens Banks MSS., sp. nov. Suffruticosa?, abundanter ramosa, glutinosa, foliis oppositis rigidis lineari-subulatis obtusis erecto-patentibus basi vaginantibus, capitulis terminalibus subsessilibus solitariis ternisve anguste cylindricis 4-flosculosis, involucri phyllis circa 7-seriatis extimis abbreviatis una cum intermediis ovatis interioribus oblongis intimis vero lineari-lanceolatis omnibus obtusis arcte adpressis firmis nequaquam scariosis, achæniis dense villosis.

Hab. Cape Colony; *Francis Masson* (Herb. Mus. Brit.): Touw River Railway Station, 1885, at 2500 ft. of elevation; *Bolus* (Herb. Kew.).

Folia 0·7 cm. long. (summa vero breviora), basi vaginante 0·15 cm. sursum 0·1 cm. lat., facie superiori plana vel leviter concava inferiori rotunda, obscure striata. Capitula 1·0 cm. long., 0·35 cm. lat. Involucri phylla extima 0·3 cm. long., 0·2 cm. lat.; intermedia circa 0·6 cm. et intima 0·9 cm. long., omnia araneoso-ciliolata et in longitudinem (saltem siccitate) pluristriata. Achænia turbinata, 0·2 cm. long. Pappi setæ vix usque 0·6 cm. long., basi ipsa concretæ.

Nearest *P. fasciculata* Linn. fil., but with many peculiar features, such as the much shorter and narrower leaves, the smaller narrower not-fascicled heads, the smaller obtuse involucral scales, &c.

Gnaphalium rosulatum, sp. nov. Caule erecto simplici humili vel elongato albide lanato, foliis radicalibus sessilibus arcte rosulatis late lineari-spathulatis obtusis supra glabris viridibusque subtus arcte albo-lanatis caulinis his similibus nisi linearibus, capitulorum cymis terminalibus subsphæroideis, capitulis oblongis obtusis lanatis vix 30-flosculosis flosculis 5 bisexualibus, involucri phyllis lanceolatis interioribus lamina acuta alba coronatis, achæniis compressis.

Hab. Sierra Nevada, Santa Marta, New Grenada; *F. A. A. Simons*, 1880 (Herb. Mus. Brit.).

Exempll. majorum caulis usque ad 17·0 cm., minorum nonnumquam ad 1·5 cm. miniatus. Folia radicalia 1·5–2·0 cm. long., 0·3–0·5 cm. lat. Cymæ 1·5 cm. diam. Capitula 0·6 cm. long., 0·25 cm. lat. Involucri phylla interiora 0·4 cm. long. Flosculi vix 0·3 cm. long. Achænia 0·1 cm. long., glabra; pappi setæ breviter barbellatæ, 0·3 cm. long.

Easily recognized from the closely rosulate radical leaves woolly below and glabrous above, and the terminal subsphæroidal cymes. The small specimens were gathered at 12,000 ft. of elevation; the larger ones probably lower down. Except in the matter of height, I can see no difference between these.

Some specimens in the Kew Herbarium gathered by Purdie at Santa Marta should most probably be referred here. They differ from Mr. Simons's only in having somewhat larger cymes, and rather larger and obtuser appendages to the scales of the involucre.

Gnaphalium Simonsii, sp. nov. Planta ascendens, crebro ramosa, ramis tenuibus foliosis arcte lanatis maturitate araneosis, foliis sessilibus linearibus nigro-mucronatis supra araneosis subtus dense lanatis laxis deinde patentibus reflexisve, cymis terminalibus depresse subsphæroideis, capitulis obovoideis circa 30-flosculosis, flosculis bisexualibus 3, involucri phyllis lanceolatis interioribus lamina acuta straminea auctis, achæniis immaturis subteretibus.

Hab. Sierra Nevada, Santa Marta, New Grenada; *F. A. A. Simons*, 1880 (Herb. Mus. Brit.).

Folia modice 1·0–1·5 cm. long. (inferiora vero sæpe 3·0 cm. attingentia) et 0·1–0·2 cm. lat., membranacea. Cymæ 1·0–1·5 cm. diam. Capitula 0·5 cm. long., 0·35 cm. lat. Involucri phylla interiora 0·4 cm. long. Flosculi 0·3 cm. long. Achænia 0·075 cm. long., glabra; pappi setæ breviter barbellatæ, 0·35 cm. long.

Allied to the last, from which it can readily be told by its branching habit, non-rosulate narrow leaves, more laxly massed capitula, straw-coloured tips to the inner involucral scales, heads with only three hermaphrodite florets, &c.

Pulicaria Phillipsiæ, sp. nov. Suffruticosa, humilis, crebro ramosa, pubescens, ramis erectis foliosis, foliis confertis sessilibus longe spathulato-oblongis deorsum integerrimis sursum pinnatifido-lobulatis, pedunculis folia excedentibus terminalibus solitariis monocephalis, capitulis pro genere majusculis radiatis multiflosculosis, involucri phyllis lineari-lanceolatis exterioribus acutis herbaceis interioribus acuminatis subscariosis, radii flosculis uniseriatis circa 20, ligulis involucrum bene superantibus oblongis brevissime tridenticulatis, disci flosculorum lobis longe acuminatis, antheris basi breviter ac simpliciter caudatis, achæniis puberulis, pappi setis exterioribus in cupulam brevem laceratam connatis interioribus paucis (circa 10) scabridis.

Hab. Somaliland, Upper Sheik and Wagga Mountain, 1897; *Mrs. Lort Phillips* (Herb. Mus. Brit.).

Tota planta 12·0–15·0 cm. alt. Radix robustus, parum tortuosus, rarissime fibrilliferus. Folia modice 3·0–3·5 cm. long., horum lobi oblongi, obtusi, 0·3–0·4 cm. long. Pedunculi 5·0–6·0 cm. long., bracteis anguste linearibus 0·5–1·5 cm. long. sparsissime onusti. Capitula matura 2·5 cm. diam. Involucrum 0·8 cm. long.; phylla extima 0·5 cm. long., intima 0·8 cm. long. Ligulæ 0·85 cm. long., 0·2 cm. lat. Achænia 0·15–0·25 cm. long. Pappi setæ interiores 0·5 cm. long., stramineæ.

The lowly habit—much that of *P. Renschiana* Vatke—the

pinnatifid-lobulate leaves, long one-headed peduncles, large heads, and the acuminate corolla-lobes of the disc-florets are the chief characters by which this plant can be recognized.

Grantia flabellata, sp. nov. Caule abbreviato crassiusculo superne sparsim ramoso oligocephalo, foliis inferioribus subrosulatim congestis longe flabellato-cuneatis apice 7-dentatis laxe araneoso-lanatis superioribus late oblanceolatis apice 3–4-dentatis albide pilosis, pedunculis crassis folia paullo excedentibus vel subæquantibus, capitulis radiatis, involucri phyllis exterioribus foliis subsimilibus late lanceolatis obtusis viridibus capitula paullo excedentibus interioribus lanceolatis acuminatis disco subæquilongis sub lente minute ciliolatis ceterum glabris, ligulis discum paullo excedentibus, achæniis basi et apice hirtulis, pappi interioris setis 10 achæniis 4-plo longioribus.

Hab. Oman, Arabia, 1898; *Lieut.-Col. A. S. G. Jayakar* (Herb. Mus. Brit.).

Tota planta circa 5 cm. alt. Folia inferiora 2·0 cm. long., basi 0·2 cm. sub apice usque 1·2 cm. lat., egregie nervosa; superiora modice circa 3·0 cm. long., summa vero breviora. Pedunculi 2·0–3·5 cm. long. Capitula 2·5 cm. diam. Involucri phylla exteriora 1·3 cm. et interiora 1·0 cm. long., hæc sursum decoloria. Achænia 0·2 cm. long., pappo 0·8 cm. long. coronata.

Nearest to *G. arachnoidea* Boiss., from which it can be easily distinguished by reason of its lowly habit, its broadly flabellate several-toothed lower leaves, its differently shaped upper leaves, its broader and shorter outer and microscopically ciliate instead of densely woolly inner involucral leaves, and its pappus with ten (not five) interior setæ.

Phæocephalus

Compositarum e tribu Anthemidearum genus novum (tab. 409).

Capitula homogama, discoidea, pauci(4–8)-flosculosa, flosculis omnibus bisexualibus, 1–2 fertilibus reliquis sterilibus. Involucrum anguste cylindricum, phyllis 5, uniseriatis, arcte contiguis, inter se liberis, concavis, inappendiculatis, dorso dense fulvido-villosis, cartilagineis. Receptaculum parvum, planum, nudum. Corollæ actinomorphæ tubulosæ limbus 5-lobus. Antheræ basi obtusæ, integræ, apice lamina lanceolata auctæ. Styli rami applanati, apice truncati et penicillati. Achænia 3–4-gono-cylindrica, utrinque angustata, in longitudinem striata. Pappus brevis, uniseriatus, e paleis paucis laceratis cupulam mentientibus compositus.—Fruticulus sparsim ramosus. Rami dense foliati. Folia alterna, integra vel trifida, rigidula. Capitula parva, 2-bracteolata, in glomerulam globosam terminalem dense aggregata. Achænia glabra.

Phæocephalus gnidioides, sp. unica. Ramis rigidis dense fulvido-villosis demum glabris, foliis sessilibus lineari-oblanceolatis mucronatis villosis mox supra fere glabris subtus araneosis minute glandulosis 0·7–1·2 cm. long. et 0·2–0·3 cm. lat. obscure uninerviis, glomerulis 2·5 cm. diam., capitulis in toto paullo ultra 1·0 cm. long., bracteolis linearibus villosulis circa 0·6 cm. long.,

involucri phyllis lineari-oblongis obtusis intus politis 0·8 cm. long., corollæ verisimiliter albæ 0·6 cm. long. tubo sursum amplificato puberulo, filamentis sursum dilatatis, achæniis 0·4 cm. long. pallide fulvidis, pappo 0·1 cm. long.

Hab. Cape Colony; *Niven* (Herb. Mus. Brit.).

This is a very remarkable plant, and looks at first sight so little like a Composite that even a botanist might be excused for referring it elsewhere pending dissection. The most singular point about it is the uniseriate involucre: in some other respects it reminds one of Inuloideous genera such as *Metalasia* and *Disparago*, but the tailless anthers forbid its reference to the *Inuloideæ*. In this latter character, as also in the nature of the style-arms, it is a typical *Anthemidea*, and this affinity is further shown by the leaves, which are exactly like those of many species of *Athanasia*, in the neighbourhood of which genus I venture to suggest that it should be placed.

Dr. Rand's Rhodesian Compositæ.

The collections made in Rhodesia in 1897 and 1898 by Dr. R. F. Rand, F.L.S., and presented to the British Museum, contain the following *Compositæ*:—

Vernonia fastigiata O. & H. Buluwayo, early June and May. Nos. 277 & 352

V. gerberæformis O. & H. Salisbury, Sept. No. 626.

V. glabra Vatke. Buluwayo, May. No. 353.

V. glabra Vatke, var. Salisbury, Sept. No. 622.

V. humilis C. H. Wright. Salisbury, late Dec. and May. Nos. 153 & 492.

V. Kraussii Sch. Bip. Buluwayo, Dec.; Salisbury, May. Nos. 150 & 624.

V. Melleri O. & H. Salisbury, Aug. No. 494.

V. Poskeana Vatke & Hildebr. var. *chlorolepis* Steetz. Buluwayo, May. No. 344.

V. Randii S. Moore. Salisbury, July. No. 495.

V. Tenoreana O. & H. Salisbury, July. No. 497.

Detris fascicularis (*Felicia fascicularis* DC.). Buluwayo, May. No. 347.

D. simulans (*Aster simulans* Harv.). Salisbury, Aug. No. 491.

D. tenella (*Felicia tenella* Nees). Buluwayo, early Jan. No. 135.

Nidorella resedifolia DC. Buluwayo, Dec. No. 137.

Erigeron canadense L. Salisbury, Aug. No. 481.

Conyza varieguta Sch. Bip. Buluwayo, May. No. 357.

Psiadia arabica Jaub. & Spach. Buluwayo, Jan. No. 138.

Laggera purpurascens Sch. Bip. Salisbury, July and Aug. Nos. 480 & 500.

Blumea gariepina DC. Buluwayo, Dec. No. 278.

Epaltes gariepina Steetz. Buluwayo, May. No. 354.

Sphæranthus peduncularis DC. Buluwayo, May. No. 355.

Gnaphalium luteo-album L. Buluwayo and Salisbury, Dec. Nos. 136 & 151.

Helichrysum cæspititium Sond. Buluwayo, early Jan. No. 100.
H. declinatum Less. Salisbury, late Dec.; Buluwayo, May. Nos. 152 & 351.
H. Kraussii Sch. Bip. Salisbury, July. No. 531.
H. leptolepis DC. Buluwayo, May. No. 348.
H. setosum Harv. Salisbury, July. No. 499.
Athrixia elata Sond. Valley of Mazoe River, Salisbury district, Sept. No. 484.
Pulicaria capensis DC. Buluwayo, May. No. 356.
Geigeria protensa Harv. var. *pubigera* S. Moore. Buluwayo, Dec. No. 104.
G. pubescens S. Moore. Buluwayo, May. No. 345.
G. Randii S. Moore. Buluwayo, May. No. 346.
Wedelia diversipapposa S. Moore. Buluwayo, Jan. No. 111.
Bidens pilosa L. Buluwayo, May. No. 340.
Chrysanthellum procumbens Pers. Buluwayo, early Jan. No. 148.
Artemisia afra Jacq. Salisbury, July. No. 486.
Gynura cernua Benth. Salisbury, Aug. No. 493.
Senecio lasiorhizus DC. Buluwayo, Dec. No. 139.
S. lasiorhizus DC., var. Salisbury, Sept. No. 628.
S. latifolius DC. Buluwayo, Dec. No. 140.
S. Randii S. Moore. Salisbury, Sept. No. 625.
Euryops Osteospermum S. Moore. Salisbury, July. No. 498.
E. Osteospermum S. Moore, var. *parvifolia*. Salisbury, late Dec. No. 109.
Othonna ambifaria S. Moore. Near Shashi River, Jan. No. 110.
Osteospermum herbaceum L. fil. Salisbury, Aug. No. 489.
O. moniliferum L., var. Salisbury, Aug. No. 487.
O. muricatum E. Mey. Salisbury, Aug. No. 389.
Tripteris amplexicaulis Less. Salisbury, Sept. No. 485.
Haplocarpha scaposa Harv. Buluwayo, Dec. No. 99.
Gazania Krebsiana Less. var. *hispidula* Harv. Salisbury, July. No. 490.
Crocodilodes Zeyheri (*Berkheya Zeyheri* O. & H.). Buluwayo, early Jan. No. 113.
Berkheyopsis integrifolia Volkens. Buluwayo, Dec. No. 133.
Centaurea rhizocephala O. & H., var. Salisbury, Aug. No. 482.
Dicoma anomala Sond. Buluwayo, June. No. 486.
Gerbera abyssinica Sch. Bip. Salisbury, Sept. No. 623.
G. piloselloides Cass. Salisbury, Dec. No. 112.
Lactuca capensis Thunb. Buluwayo, May; Salisbury, July. Nos. 349 & 488.
Sonchus Elliotianus Hiern. Salisbury, Sept. No. 483.
S. macer S. Moore. Salisbury, Sept. No. 627.

(To be continued.)

THE EUROPEAN SPHAGNACEÆ

(after Warnstorf)

By E. Charles Horrell, F.L.S.

(Continued from p. 122.)

Descriptions of Species.

§ 1. Sphagna acutifolia Schimp. Spp. 1–11.

Leaves of the spreading branches usually ovate-lanceolate, small to medium size, toothed on the narrow or rather wide truncate apex; border narrow; margin incurved from the apex as far as the middle, more rarely further down; when dry with or without metallic lustre, never undulate; imbricate, erecto-patent or squarrose. Chlorophyllose cells in section equilateral to isosceles-triangular or trapezoid, always inserted between the hyaline cells on the inner surface of the leaf; hyaline cells much more convex on the outer surface, and generally there completely enclosing the chlorophyllose cells; hyaline cells on the inner wall, which is common to both hyaline and chlorophyllose cells, always smooth. Pores on the inner surface of the leaf round, and generally most numerous near the lateral margins; on the outer surface generally half-elliptical, in rows on the commissures; towards the leaf-margins round, and frequently immediately opposite the pores on the inner surface; in the apical part of the leaf at times very small, round, and strongly ringed. Stem-leaves in form, fibril-structure, and pore-structure very various; at the lateral margins generally with relatively broad border, which is much widened below. Cortical cells of the stem of median width and thin-walled; superficial layer on the outer wall not rarely with "membrane thinnings" or with one (rarely two) large pores; inner walls with small pores. Monoicous, dioicous, or polyoicous. Plants especially in the upper part frequently purple- or violet-red.

1. S. fimbriatum Wils. in Hook. Fl. Antarct. ii. 398 (1847).
Exsicc. Braithw. Sphagn. Brit. Exs. no. 43 (1877).

Tufts lax and deep or compact and shorter; above usually grey-green or yellowish, more rarely pale or brown throughout, never red. Plants usually slender and thin, resembling in habit a delicate *S. acutifolium* or *S. Girgensohnii*.

Wood-cylinder always pale green or yellowish, never red.

Stem-cortex 2–3-layered, superficial cells usually somewhat wider, and with one, more rarely with two ringed pores each; transverse and lateral walls of the inner cells also porose.

Stem-leaves large, from a narrower base, gradually wider and rounded above, and hence spatulate; by reabsorption of the cell-membrane fimbriate in the entire upper half, not only at the apex, but also for some distance down the lateral margins; hyaline cells in the apical part of the leaf very wide, rhomboid, generally several times divided, almost invariably non-fibrillose and without pores;

border much widened below, and formed of very narrow cells with pitted walls; auricles very small.

Fascicles according to the habitat, sometimes distant, sometimes close together, each of 3–4 branches, of which the two stronger are spreading, the others pressed against the stem; spreading branches usually thin, long, pointed and arcuate, more rarely shorter and anocladous or orthocladous.

Branch-leaves imbricate or with recurved to squarrose apices; ovate-lanceolate, narrowly bordered, with margin incurved above; apex rounded-truncate and toothed, longitudinally plicate in the middle above the base. Hyaline cells with remarkably distant fibrillar rings on the inner surface in the upper half of the leaf; especially near the lateral margins with numerous large unringed pores, which are usually placed between the fibrils; on the outer surface with more numerous pores, which become gradually larger from the apex to the base of the leaf; the uppermost strongly ringed, the middle ones with weaker border, and the lowermost non-ringed and in the middle of the cell-wall, while the others are semi-elliptical and placed on the commissures; the inner and outer pores at times cover one other, so that in the upper half of the leaf, especially near the margins, complete perforation of the cell ensues; cell-membranes with numerous plicæ. Pore-formation in the leaves of the pendulous branches similar, but on the outer side near the apex also with large cavities. Retort-cells of the branch-cortex without recurved neck, with a large opening at the apex, and frequently also with a small pore in the lower part.

Chlorophyllose cells in section isosceles-trapezoid, inserted between the hyaline cells on the inner surface, and free on both surfaces; hyaline cells more strongly convex on the outer surface.

Monoicous; male branches in the antheridium-bearing part clavate, at first yellowish, later light brown, never red; perigonial bracts ovate, suddenly produced above into a short truncate and toothed apex; pore-formation as in the other branch-leaves, in the middle part above the base almost always non-fibrillose and non-porose. Perichætial bracts large, lingulate-spatulate, composed in the lower part of elongated rectangular pitted chlorophyllose cells only, in the upper part with both kinds of cells; hyaline cells at the apex at times large, rhomboid, several times septate and with reabsorbed membrane, and hence the apex itself is often fimbriate; usually, however, the apical part of the leaf is cucullate, and is then composed of small somewhat remarkable green cells only; always non-fibrillose and non-porose; margin very wide; auricles small; capsule large, urceolate when empty, pseudopodium up to 4 cm. long. Spores yellow-brown, smooth, 25–30 μ in diameter.

Hab. Shady swamps in forests, swampy margins of lakes, alder-swamps, clay-pits, &c., in the plains and lowland regions; much less common in mountainous regions.

S. fimbriatum is a comparatively but little variable species, and Warnstorf at present recognizes three main varieties, *viz.*:—

(1) Var. *robustum* Braithw. in Sphagn. Brit. Exsicc. No. 44 (1877). (Syn. *S. squarrosum* var. *laxum* Braithw. in *The Sphagnaceæ*,

61, 1880.) Plants very robust, resembling in habit a robust *S. Girgensohnii*. Tufts pale and lax. Stem-leaves very large, otherwise normal. Pores in the stem-cortex very strongly developed. Fascicles, according to the wetter or drier habitat, more widely separated, or nearer together; the spreading branches even immediately below the capitulum very long (to 3 cm.) and recurved; cortical cells of branches with scattered pores; branch-leaves very large, imbricate or with the apex more or less squarrose. Of this variety the var. *flagellaceum* Schlieph. (in Irmischia, 1882) (syn. var. *flagelliforme* Warnst. in Flora, 1882, 208) is a very lax long-branched and pale form. This form I have found near Harlech, Merionethshire.

(2) Var. *tenue* Grav. apud Warnst. in Bot. Gaz. 1890, 128. Tufts usually lax, green or whitish green; plants graceful and slender, with long and slender spreading branches. Of this variety the var. *squarrosulum* H. Müll. in Westph. Laubm. No. 241, is a shorter form with squarrose leaves; the var. *submersum* Roell in Flora, 1886, 135, is a submerged or floating form (Islay, Scotland, *Gilmour*, 1898); the var. *compactum* Warnst. in Die Europäische Torfm. 115 (1881) is a densely tufted form; and the var. *strictum* Grav. is a form with upright spreading branches.

(3) Var. *arcticum* Jens. Tufts firm, compact, whitish. Stem with short closely arranged generally erect and stouter branches. Leaves shorter and closely imbricate.

2. S. Girgensohnii Russ. Beitr. 46 (1865).

Syn. *S. acutifolium* var. *tenue* Bryol. Germ. i. 22 (1823). *S. fimbriatum* var. *majus* A. Braun in Herb.; var. *strictum* Lindb. Torfm. Byggn. 138 (1862). *S. strictum* Lindb. in Act. Soc. Sc. Fenn. x. 263 (1872).

Exsicc. Braithw. Sphagn. Brit. Exs. No. 42*a*.

Delicate forms resembling *S. fimbriatum*, the more robust ones resembling the green or pale forms of *S. Russowii*. Tufts looser or denser, higher or lower, greyish-green, bluish-green, yellow-green, straw-coloured, brown or pale throughout. Plants never red, when dry usually somewhat rigid.

Wood-cylinder always yellowish or pale, never red.

Stem-cortex of 3–4, rarely 2–3 layers; superficial cells with 1, rarely with 2–3 generally ringed pores each; cross-walls of the inner cells likewise porose.

Stem-leaves generally of medium size, rarely small or large, with slightly undulate margins, above not or very rarely slightly widened, hence lingulate to lingulate-spatulate, generally fimbriate on the whole broadly-rounded apex; border broad, becoming wider near the base and formed of very narrow pitted cells, frequently pale brown, never reddish; the upper hyaline cells almost quadrate or broadly rhomboid, very seldom divided, with reabsorbed membrane; fibrils and scattered pores very rare in the middle of the leaf, less rare near the lateral margins, and here also at times with pseudo-fibrils; usually, however, without any fibrils.

Branches 3–5 in a fascicle, the 2–3 stronger, spreading, usually elongated and drepanocladous, or shorter and but little bent outwards, anocladous or orthocladous. Retort-cells of the branch-

cortex with not or only slightly recurved neck, at the apex with a single large opening, and frequently also with an unringed pore in the middle. *Branch-leaves* in form and cell-structure similar to *S. fimbriatum*, lanceolate, toothed at the rounded-truncate apex, margin incurved above, narrowly bordered, in the middle of the leaf above the base with a longitudinal fold, hyaline cells with membrane-folds and distant fibrillar rings. Pore-formation of the leaves of the corresponding branches as in *S. fimbriatum*.

Chlorophyllose cells in section shortly isosceles-trapezoid, inserted between the hyaline cells on the leaf inner surface, and free on both surfaces; hyaline cells more convex on the outer surface of the leaf.

Dioicous; male branches thickened in the antheridium-bearing part, light brown, never red. Perigonial bracts somewhat broader and shorter than the leaves of the sterile branches, above produced into a short toothed apex having the margin inrolled, in the lower part non-fibrillose and non-porose. Upper (inner) perichætial bracts large, broadly oval, produced into a narrowed broadly truncate and slightly emarginate apex, border wide; the bracts in the lower part formed only of long rectangular chlorophyllose cells, in the middle and upper parts with both kinds of cells, and at the apex itself again of usually small vermicular chlorophyllose cells only; always without fibrils or pores. Auricles very small. Capsule large, on a longer or shorter pseudopodium. Spores yellow-brown, smooth. 30–33 μ. Fruit very rare.

Hab. Damp marshy fir-woods; rare in the plains, but one of the commonest species in mountainous and alpine regions.

Distrib. Scandinavia, Finland, Scotland, England, Germany, Belgium, Asia, North America.

S. Girgensohnii is most closely related to *S. Russowii;* but Russow, after having examined at least one thousand specimens of the former and five hundred of the latter, states that in no case was there any difficulty in determining to which species any specimen should be referred, and was convinced that they constitute two good species. The chief distinguishing characters are—(1) the colour; (2) the number, and (3) the size of the pores on the stem-cortex; (4) the fibrils and the plicæ in the hyaline cells of the stem-leaves; and (5) the division of the hyaline cells.

About thirty varieties of *S. Girgensohnii* have been described, of which the following are the most important:—

(1) Var. *coryphæum* Russ. in Warnstorf, Europ. Torfm. ser. i. no. 26 (1888). Plants 15–50 cm. high, generally vivid green, light or dark, in the lower part frequently dirty rust-colour to almost black. Capitulum generally beautifully stellate, more or less compact, either umbrella-like or flat. Branches of the capitulum generally thickened at the end, frequently much so, more or less obtuse. Generally meso-, rarely macro- or brachy-, homalo-, drepano-, or cato-cladous, never ortho- or ano-cladous, frequently eurycladous. In loose deep tufts in very damp or generally quite wet situations in pine or mixed forests. Stem-leaves of medium size, generally brachyphyllous, as broad or broader than long, rarely a little longer to 1½ times as long as wide; generally from the broad

base narrowed above, with the apex slightly truncate and toothed. Median hyaline cells above the base generally much widened; never with pseudo-fibres, never hemi-isophyllous. Pores of the stem-cortex large, numerous, bordered or more frequently not bordered. Relatively frequent in fruit.

(2) Var. *commune* Russ. in Warnst. Europ. Torfm. ser. iv. no. 373 (1894). Stem-leaves of medium size, lingulate, truncate and strongly fimbriate; capitulum not large, with the branches not arranged in a star-like manner, not rigid, frequently delicate and soft; in smaller, medium size or large tufts, light-green, grey-green to dark-green, yellowish-green to brownish-yellow; meso-, rarely brachy-cladous, drepano-, homalo-, ano-, eury-, or dasy-cladous; very rarely fruiting. In damp but not very wet places.

(3) Var. *cristatum* Russ. Archiv. Naturk. Liv- Est- & Kurl. ser. 2, band x. (1894). Plants of medium size to large, 10–20 cm. high or more, generally in loose, rarely in dense tufts. Pale grey-green or yellow-green, rarely green. Branches of the capitulum obtuse, in male plants towards the apex very markedly clavate and whitish, the lower part of the male branches a pale dirty rust-colour, rarely a vivid rust-red. Meso-brachycladous, homalo-, drepano-, ano-, to ortho-cladous; sometimes dasycladous, with very dense capitulum. Fruit rare. Stem-leaves large, or of medium size, mesophyllous, rarely brachyphyllous. In less damp situations than var. *coryphæum*.

(4) Var. *densum* Grav. apud Warnstorf in Hedwigia, 1884, 119. Tufts dense, about 7–8 cm. high, and pale brownish. Fascicles close. Branches either elongate and very thin at the apex and spreading or recurved, or shorter and anocladous, especially in the capitulum.

(5) Var. *gracilescens* Grav. apud Warnstorf in Hedwigia, 1884, 119. A slender delicate form of the habit of *S. fimbriatum*, with elongate recurved spreading branches.

(6) Var. *hygrophilum* Russ. in Warnst. Samml. Europ. Torfm. ser. i. no. 50). Stem-leaves of medium size to large, lingulate, broadly truncate and fimbriate, capitulum scarcely distinct; greyish-green, vivid green to yellowish- or brownish-green and brown; generally very robust, with the branch-fascicles very regularly arranged in rows, generally dasycladous.

(7) Var. *leptostachys* Russ. in Warnstorf, Europ. Torfm. ser. i. no. 38 (1888). Plants 20–40 cm. high; tufts rather dense, not very widely spread, in damp to wet situations in bogs. Branches generally thin and delicate, often filiform. Male branches somewhat markedly clavate, of a vivid yellow-rust colour. Plants yellow- or pale-green or dirty grey-green; generally meso-eurycladous, homalo- or ano-cladous, more rarely macro-catacladous or dasycladous. Stem-leaves large to very large, but little longer than wide, at the apex but little or not at all narrowed, broadly truncate and fimbriate. Rarely fruiting.

(8) Var. *molle* Russ. in Warnstorf, Europ. Torfm. Plants 5–15 cm. or more in length, weak and delicate, light to rather dark green tinged with yellow or brown, to dark brownish-yellow, sometimes bluish- or grass-green, darker coloured below. Meso- to

macro-cladous, generally drepanocladous, sometimes homalo- and cato-cladous or eury- and dasy-cladous; in somewhat extended tufts in low-lying damp grassy places in alder and birch swamps. Stem-leaves of medium size to small, not rarely with pseudo-fibrils; hemi-isophyllous forms not rare.

(9) Var. *squarrosulum* Russ. in Archiv. Naturk. Dorpat. Biol. vii. 1870, 130. Plants very small; branch-leaves recurved at apex; branches shorter, only slightly curved.

(10) Var. *stachyodes* Russ. in Warnstorf, Europ. Torfm. ser. i. no. 50 (1888). Stem-leaves of middle size to large, frequently twice as long as wide. The whole plant spike-like, of the same width from the base to the apex. Capitulum not broader than the rest of the plant, comal branches generally very regularly radiating; generally only green or yellow-green at the top, below yellowish or whitish; brachy- to meso-, more rarely macro-cladous; homalo-, drepano-, ano-, and ortho-cladous, often delicate and dasycladous. Small to very robust, forming cushion-like masses in swamps and grassy places in woods.

(11) Var. *xerophilum* Russ. in Archiv Naturk. Liv- Est- & Kurl. x. 4, p. 503 (1894). Stem-leaves small to medium size, lingulate-rectangular, very broadly truncate, at times wider at the fimbriate apex than at the base. Capitulum not marked, generally dasycladous; greyish or yellowish green, generally yellow to brown. In relatively dry places, and most of the alpine forms of the species belong here. Sometimes compact and homalo-, ano-, or ortho-cladous; sometimes delicate, soft, and leptocladous; sometimes robust, rigid, and pachycladous.

3. S. Russowii Warnst. in Hedwigia, 1886, 225.

Syn. *S. acutifolium* var. *robustum* Russ. Beitr. 39 (1865). *S. robustum* Roell in System. der Torfm. in *Flora*, 1886 (extens.).

Exsicc. Braithw. Sphagn. Brit. Exs. 42*b*, pl. ♂.

Habit and colour very varied. Plants generally stately and robust, resembling in size and appearance *S. Girgensohnii*. Tufts looser and deeper or denser and shorter, pale yellowish-green, green, brownish-yellow, violet-, rose-, or purple-red.

Wood-cylinder usually red, more rarely pale.

Stem-cortex irregularly 2–3- or 3–4-layered; superficial cells with irregularly scattered small or large non-bordered pores; inner cortical cells with numerous small pores.

Stem-leaves generally large or very large, rarely of medium size or small, wide-lingulate, with somewhat undulate lateral margins, only in the middle of the broad rounded apex toothed or somewhat fimbriate; leaf-border much widened below, the hyaline cells in the upper part of the leaf large, broadly rhomboid, usually non-septate, but with delicate membrane-folds, all the hyaline cells with membrane-thinnings, which rarely pass over into actual pores near the margin, towards the apex; generally without fibrils and pores, rarely fibrose below the apex.

Fascicles with 4–5 branches, distant or closely approached; 2–3 stronger branches spreading, recurved and homalocladous, or

anocladous, sometimes longer, sometimes shorter, the pendent branches very long and closely adpressed to the stem. Retort-cells of the cortex with the neck but little recurved, and having always a large pore at the apex, and frequently also another in the middle.

Branch-leaves closely or loosely imbricate, usually with the apex somewhat recurved, more rarely almost squarrose, very rarely almost secund, lanceolate, narrowly bordered, margin incurved above; toothed on the straight- or round-truncate apex; with 2–3 plicæ above the base; the hyaline cells with membrane-folds; pore-formation on both surfaces of the leaf as in *S. fimbriatum*.

Chlorophyllose cells in section isosceles-triangular to isosceles-trapezoid, inserted between the hyaline cells on the inner surface of the leaf, and here free; the chlorophyllose cells are either enclosed by the hyaline cells on the outer surface or free. On the inner surface the hyaline cells are slightly convex, much more so on the outer surface of the leaf.

Dioicous, rarely monoicous; male branches in the antheridium-bearing part clavate, always violet- or purple-red; bracts in form, cell-structure, and pore-formation similar to the leaves on the sterile branches, usually fibrillose to the base, more rarely some cells above the base without fibrils. Perichætial bracts as in *S. Girgensohnii*, at times red. Spores 21–33 μ in diameter, smooth, yellow. Fruit rare.

Hab. *S. Russowii* inhabits similar localities to *S. Girgensohnii*, and the two not infrequently occur in an intimate mixture.

Distrib. Europe, most commonly in the northern regions; up to 6600 ft. in the Carinthian Alps; Asia; North America.

The varieties, of which the following are the most important, are in the first place based upon the colour of the tufts:—

(1) Var. *virescens* Russ. in Zur Kenntniss, in Arch. Naturk. Liv- Est- und Kurland, Bd. x. Lief. 4, p. 505 (syn. var. *Girgensohnioides* Russ. apud Warnstorf in Bot. Gaz. xv. 132. Entirely green or with but a slight tinge of red.

(2) Var. *flavescens* Russ. Zur Kenntniss, *l. c.* Yellow forms with a slight admixture of green or red.

(3) Var. *purpurascens* Russ. *l. c.* More or less purple forms.

(4) Var. *rhodochroum* Russ. *l. c.* Forms having a mixture of yellow or yellow-green with light delicate brick-red or almost rose-red. This red is generally especially distinct in the lower part of the plant, and is quite distinct from the bluish-red of the male branches.

(5) Var. *pœcilum* Russ. *l. c.* Forms of a dull violet-red colour.

(To be continued.)

THE GENUS MATHIOLA IN BRITAIN.

By James Britten, F.L.S.

In the *Botanical Magazine* for March (t. 7703) Mr. Hemsley writes: "Both [*Mathiola*] *incana* and *M. sinuata* are now found growing wild in Britain; the former on cliffs in the Isle of Wight, and the latter on the coasts of Devon, Cornwall, and Wales; but neither is regarded as indigenous or aboriginal." It would be interesting to ascertain the views of British botanists as to this summary exclusion of two plants from our Flora; the following notes on their occurrence may help them to form a conclusion.

With regard to *M. sinuata*, its nativity is now for the first time, so far as I can ascertain, called in question. Watson never doubted it, and its record extends back for nearly three hundred years. Johnson (1633) sets aside the English localities which Gerard records for this and other plants described in the same chapter in these words: "I have not hard [*sic*] of any of these wilde on our coasts but onely the second [i. e. *M. sinuata*], which it may bee grows in these places here set downe; for it was gathered by Mr. George Bowles upon the Rocks of Aberdovye in Merionethshire" (Ger. emac. 461). Samuel Brewer in his diary, under date Aug. 28, 1727, writes: "In our way to Abermeney near the shore, and also at some distance further into the sands, I found great plenty of *Leucojum marinum majus*, Syn. 291; but all in the circumference of about ¼ of a mile, and but one plant of them in flower and that with good seed." Ray, in 1686, writes: "Invenimus in litore arenoso insulæ Angleseiæ in Anglia è regione Caernarvan oppidi in Wallia, atque etiam in extrema parte Cornubiæ, et alibi in litoribus arenosis" (*Hist. Plant.* i. 780): the Carnarvon locality he describes in *Cat. Plant. Angl.* 192 (1670) as "at Aberdaren in Carnarvanshire." In the herbarium of Adam Buddle (d. 1715) there is a specimen "from Mr. Stephens out of Cornwall." In 1773 Banks collected it in Flintshire at "Breton Ferry, on a little sandy bay through which the road passes at low water half a mile to the westward" (Herb. Mus. Brit.). *M. sinuata*, indeed, seems to have been a characteristic plant of the Welsh coast, for, besides the localities already mentioned, we have specimens from Barmouth (Merioneth), Swansea (Glamorgan), Tenby (Pembroke), and Traeth Mawr (Hugh Davies), a bay at the mouth of the Madoc, on the border of Carnarvon and Merioneth.

It is clear, however, that the plant has long been dying out, and it would be worth while to ascertain whether it is still to be found. Dillwyn (*Flora of Swansea*, 35 (1848)) says: "In 1802, was plentiful on the sandhills between Swansea and the Mumbles, but has now become rare: it grows also sparingly on the sea-side between the Eastern Pier and Crumlyn Burrows." A note by the Rev. D. Broughton in *Phytol.* iv. 880 (1853) states that at Barmouth, where it was "formerly abundant," he "could only find three weak plants, not in flower." Mr. Griffith, in his *Flora of*

Anglesey and Carnarvon, says it is extinct in both these counties. But there seems no ground for doubting that *M. sinuata* is "indigenous or aboriginal" in Wales.

In England it may be regarded as probably extinct, although there seems no reason to suppose that it was not indigenous in Cornwall (whence it was recorded by Ray), Devon—we have a specimen collected at Bideford by Mr. Maw in 1849—and Sussex. Mr. Mansel Pleydell does not include it as a Dorset plant; but in Smith's *Correspondence* (i. 435) will be found a letter from the Marquis of Blandford, dated Aug. 9, 1798, in which he speaks of having found it, with *Diotis*, on Brownsea Island, near Poole.

In Ireland it is "a decreasing species," but the authors of the *Cybele Hibernica*, ed. 2, express no opinion adverse to its nativity, and it has been on record for nearly a century as an Irish plant.

The position of *M. incana* is less satisfactory. As the authors of the *Flora of Kent* point out, the continental distribution is adverse to its nativity; and the fact that "Miss Pratt regarded this as probably wild" at Ramsgate goes for very little. Yet the descriptions of the habitat of the plant, both in Sussex and in the Isle of Wight, make it difficult to suppose that it can have been introduced, unless with deliberate intention. The first record (*Engl. Bot.* t. 1935) runs: "Discovered by Mr. Turner and Mr. W. Borrer in 1806 on the cliffs to the east of Hastings, where this specimen was gathered May 27, 1808. It grows on such inaccessible rocky ledges as to be obtainable only by a person let down from the summit with a rope." The first record from the Isle of Wight is quoted by Mr. Townsend from Snooke's *Flora Vectiana* (1823):—"The cliffs from Compton to Freshwater Gate are covered by a *Cheiranthus*, not easily accessible." Watson (*Cybele*, i. 155) quotes from Bromfield a description of the cliffs as lying "under the wild elevated tract of Afton Down, which is inhabited by the sheep alone. It is very plentiful on the bare perpendicular face of the chalk rock, forming bushes of two feet high, with thick woody stems, sometimes as thick as the wrist, and lasting several years." The other Isle of Wight locality—"Cliffs between Steep Hill Cove and Ventnor Cove"—was recorded by Borrer in *Comp. Bot. Mag.* i. 190 (1835), and of this as of the former Bromfield says (*l. c.*): "there is nothing to indicate a suspicion of the plant's having escaped from cultivation." It is right to say that Bromfield, who by no means erred on the side of caution, expressed later the opinion that the plant was "probably naturalized" (*Fl. Vect.* 28). Mr. Townsend (*Fl. Hampshire*), who had then (1883) known the plant in both stations "for the last thirty-five years" expresses no opinion as to its nativity. But whatever conclusion may be arrived at with regard to *M. incana*, the claims of *M. sinuata* to rank as an aboriginal member of the British Flora seem to me beyond dispute.

NEW CAPE PLANTS.

By Major A. H. Wolley-Dod, R.A.

Oxalis versicolor L. var. latifolia, var. n. Leaves much broader than in the type. Peduncles densely glandular, often axillary. Black River, by Camp Ground, No. 70 of my collections. Except for the crimson edge to the corolla-lobes, the variety has little look of the type, and the axillary inflorescence might lead one to suppose it to be a distinct species; but this character occurs not infrequently in other allied species, notably in *O. falcata* Sond., in which it is described as terminal. Forms of the above-described variety are not infrequent in young pine-plantations about Claremont.

O. denticulata, sp. n. Stemless. Corm very small, about 3 l. by 1½ l., with thin soft scales. Leaflets rounded, emarginate, pale green both sides, glabrous, or rigidly ciliate, the ciliæ often on broad apiculate denticulations, translucent dots very obscure. Scape longer than the leaves, bibracteated near the top. Sepals acute, 3 l. to 4 l. long. Corolla 12 l. to 16 l., with a funnel-shaped golden yellow tube, and a white, rarely deep rose limb.

Flats between Rondebosch and Claremont, No. 1265 (white), 1298 (deep rose).

A frequent plant, always growing in damp places, and in dense masses. It has been most unaccountably confused with *O. purpurea* Thunb., from which it is abundantly distinct. That species is readily distinguished by its deep green leaves, purplish beneath, generally pubescent, and densely woolly-edged, conspicuously dotted. Bract or peduncle usually only one, very minute, often absent. Corolla-tube quite cylindrical, dull reddish yellow. *O. denticulata* is really much nearer *O. convexula* Jacq., but the latter has glaucous, hollow dotted leaves, never denticulate nor ciliate; its sepals and corm are also different.

Mesembryanthemum calcaratum, sp. n. Stem suberect, with many ascending branches from the base. Leaves terete, subulate, 2 l. to 4 l. long, with a straight very acute point, faintly dotted, produced into a short straight spur below the attachment. Flowers solitary, numerous. Peduncles ancipitous, ½ to 1 in. long. Calyx segment reflexed in flower, erect in fruit, tube abruptly contracted below limb. Petals erect, about 2 l. long, bright rose. Styles slender, erect, about 1 l. long, nearly equalling the stamens.

About Claremont and Kenilworth Flats, Nos. 2857, 2860.

A locally frequent plant, at first sight very like *M. filicaule* Haw., but quite distinct in habit, and in its aperond leaves, which appear to be unique in the genus. I think it best placed in the section *Adunca*, though the leaves are not hooked, neither do they ever seem to be in *M. filicaule*.

Romulea papyracea, sp. n. Corm about ½ in. in diameter, with very thick papyraceous tunics. Basal leaves about three, glabrous, 4–6 in. long, recurved and adpressed to the ground, soft, with a very broad striate central and two prominent lateral ribs. Peduncles very short, branched low down into two to four short

glabrous pedicels. Corolla very pale magenta-pink, darker externally. Spathes both wholly herbaceous, very strongly ribbed and keeled, the outer as long as the flowers, with a remarkably attenuate point, the inner about half as long. Styles shorter than the anthers, which are about twice as long as the filaments.

In the plantation on the Lower Plateau, Table Mt., 2300 ft., No. 3075.

A very strongly marked species which approaches no other that I know, or can find in herbaria.

Geissorhiza pubescens, sp. n. Corm 2–3 l. in diameter, with shining brown hard concave tunics. Stem subglabrous. Leaves about 1½ l. broad, densely pubescent. Perianth-tube shorter than the spathe, limb blue, with narrow acuminate segments. Spathes brown and scarious in the upper two-thirds.

West slopes of Lion's Head and Signal Hill, Nos. 1246 and 1602.

A locally plentiful plant, much resembling *G. secunda* Ker, but with totally different corm-tunics, subglabrous scape, pubescent leaves, and smaller pale blue flowers. The whole plant is usually smaller than *G. secunda*.

Aristea pauciflora, sp. n. Densely cæspitose. Leaves 6–12 in. long, rigid, very acute. Stem 9–12 in. high, strong ancipitous above, with sheathing leaves. Raceme of 3–5 clusters each of 1–2 sessile flowers. Bracts ¾–1 in., lanceolate-acuminate, often curved on back. Inner spathe whitish or pale brown, not lacerate. Perianth-limb ⅓–½ in. Capsule ½ in., on pedicels ¼–⅓ in. long.

Orange Kloof, No. 3507. Near summit of Table Mt., No. 2157.

Very near *A. Zeyheri* Baker, of which I have only seen a single specimen, but the spathes are not lacerated, and bracts are longer in *A. pauciflora*. It is also near *A. racemosa* Baker, but that species has stalked flower-clusters.

THE SPECIES AND HYBRIDS OF MENTHA.

By M. Ernest Malinvaud.*

On entering upon the systematic study of the French forms of the genus *Mentha*, it is easy to differentiate five principal groups, those we have previously called "cardinal species." † These are *Mentha sylvestris*, *M. viridis*, *M. rotundifolia*, *M. aquatica*, and *M. arvensis* of the Linnean nomenclature.‡

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* [Translated (from the Comptes-rendus du Congrès des Sociétés Savantes en 1898—Sciences) and printed in the belief that M. Malinvaud's views will interest critical botanists among ourselves.—Ed. Journ. Bot.]

† See Bulletin Soc. Bot. de France, vol. xxi. (1877), Revue, p. 43.

‡ We have not renounced our former view of *Mentha viridis* as a subspecies of *M. sylvestris*; but here the error, chiefly relative and bearing upon a point of individual perception, is in any case purely a matter of theory, while practically the elevation of *M. viridis* to the rank of a species materially facilitates the demonstration of facts.

If, however, encouraged by the success of this primary distinction, one would proceed to the distribution of the subordinate forms so far as to define clearly the limits of the respective cardinal species, it is not long before one is met by an unexpected obstacle. The lamentation of Linnæus over a similar critical genus—"Species Rosarum difficillime limitibus circumscribuntur et forte naturâ vix eos posuit"—would here be equally applicable.

For instance, there are found side by side with typical specimens of *Mentha aquatica* and *M. arvensis* ambiguous and varying forms, in which are combined the distinguishing characteristics of these two species. They are linked each to each by a continuous chain of intermediate individuals, among which one vainly seeks to determine where the first species ends and the next begins. It seems to be a case in which one might adopt the formula of Kunth, who held that the forms of plants connect like the parts of a ribbon; "cut it where you will," he says, "there are species." Certainly nothing can be more false, generally speaking, but the expression is suggestive, and gives a good idea of the difficulty to be solved. Deductive botanists like Bentham, in DeCandolle's *Prodromus*, cutting the ribbon pretty nearly in the middle, have united either to *M. arvensis* or to *M. aquatica* the portions nearest to each; while the partisans of the opposing method, moulding the nebulous material presented to their subtle creations according to their own analytical principles, have drawn from, without exhausting it, a varied assortment of supposed species which even their creators do not always recognize apart from the specimens that served for the original illustration.*

Two reasonable solutions only fit this problem, and it is on account of the persistent effort made to find a third that the work of nature in the genus *Mentha* has remained a sealed letter up to the present time. Should one see in *Mentha aquatica* and *M. arvensis* extreme variations of a single species, or hybrid products of the intermediate forms that connect them? Later on we shall point out a third hypothesis, which according to our opinion is a dangerous sophism. Of the two given above, the improbability of the first ought to lead us to verify the exactness of the second, by extending our researches through the French forms of the genus *Mentha* properly so called.† This laborious inquiry, too often hindered or interrupted, has been carried on for twenty years. Desiring, however, to complete it in several details before describing its phases and results, we shall confine ourselves here to pointing out some of the most striking facts that have been actually obtained.

Although our observations have been frequently directed towards the Mints of other countries, yet, as we have not in

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* Malinvaud, *Trois Genres Critiques*, 1890.

† Relatively and parallel to *Eumentha*, *Mentha Requienii*, *Pulegium*, and *cervina* constitute each a subgenus or distinct genus.

their case the number and choice of materials that we can command for the French forms, it will be exclusively to these—at least until a new departure—that we intend to restrict the following generalizations.

1. *Mentha rotundifolia* and *M. sylvestris* hybridize persistently wherever they are found in the company or neighbourhood of each other; to this rule, in France, we have yet to discover an exception, and the individual plants resulting from the cross often exist in such abundance that they might be supposed to represent the legitimate dominant species. This explains how botanists (*floristes*) of the status of Fries and Godron believed they saw in the hybrid the type of *Mentha sylvestris*, and attached placed forms of this species under *M. viridis* as a variety *canescens*. This capital error, as we long ago pointed out,* was the source of an enigma in the classification of the Mints of the group *Spicatæ* that remained unsolved for nearly a century.

2. *M. aquatica* and *M. arvensis* cross with the same facility and equal persistence wherever they are met with. This group of products corresponds to the *M. sativa* of Linnæus; it has provided the botanists of the analytical school with an inexhaustible vein for specific creations, and under this single head the nomenclature of the genus has been swelled by more than a hundred names.

We have obtained experimentally the hybrids of these two categories.

3. *M. viridis*, rarer in France in a spontaneous state than its congeners, shares in different combinations, mostly horticultural in origin. A portion of its characteristics is found in *M. rubra*, *M. piperita*, *M. gentilis*, &c.

4. Crosses between *M. aquatica* and *M. rotundifolia* or *M. sylvestris* are infrequent. Certain incontestable examples can, however, be cited: *M. Maximiliana*, *Schultzii*, *Mauponii*, *pubescens*, *nepetoïdes Ayassei*, &c., nearly all of them falling under our division of *Spicatæ petiolatæ*.

5. Hybrids of the formula *arvensis-rotundifolia* are scarce, and often wanting in stability. We have found several varieties in the neighbourhood of Provins.

6. Finally, with the exception of a doubtful form, of garden origin, we do not, up to the present, know any authentic example of spontaneous hybridization between *arvensis* and *sylvestris* in France.†

Independently of simple hybrids, complex cases are noticed, such as super-hybridizations, the participation of three parents in place of two, &c. The examination of these complications would exceed the scope of this brief communication. To sum up: among the categories of hybrids here laid down, the two first have a

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* Bull. Soc. Bot. de France, xxv. 141.

† Many hybrids of the formula *arvensis-sylvestris* have been discovered in Central Europe.

special importance, because they stand in opposition to the generally received opinion as to the accidental and often unstable existence of hybrid productions. The Mints answering to the formulas *rotundifolia-sylvestris* and *aquatica-arvensis* behave to all appearance like true species, to the extent of having deluded, and kept in delusion, the vast majority of *floristes* with regard to them. They seem to justify Kunth's ribbon allegory, but this comparison has its foundation only on a superficial examination of facts. In either case, one can always (first freeing oneself from all party spirit) accurately verify the double origin of intermediate forms, and the two specific unities, freed from the confusion that surrounds their outline, appears perfectly clear.

The preservation of hybrids is favoured, in the Mints, by the mechanism of a powerful vegetative system which, by the help of layers and suckers, assures an almost indefinite propagation of the plant without the aid of the sexual organs, which, especially in the males, are more often than not imperfectly developed. The vegetation of individual hybrids, usually more vigorous than that of the parents, extends in certain cases as far as actually supplanting them, and may became predominant, if not even exclusive, in the locality where they originated.

In conformity with a conclusion already formulated, the interest of these new data is increased by the belief that analogous processes of investigation, when their utility is once better understood, will be applied with success to other critical genuses—*Rubus*, *Rosa*, *Hieracium*, &c. It is only then that the examination of questions apparently insolvable, which these names will recall to the botanist, can be resumed upon a new basis, and that at last the vicious circle of fruitless discussions, within which the old methods confined them, will be broken. The most recent labours of learned monographers—for instance, those of M. Crépin on *Rosa*, and of M. Boulay on *Rubus*—tend more and more to strengthen this hypothesis.

There remains a word to say on a theory to which we alluded above. It substitutes for the facts of hybridization that we have established, imaginary phenomena of evolution. The intermediate forms connecting two species, in place of being hybrids, would correspond to phases of the incubation of new species in process of formation, springing of the old, but receding gradually by successive differentiations, whose last term, after the extinction of the middle stages, would end by realizing a definite type. This application in miniature of the Darwinian theory amounts in reality to an avowal of inadequacy. The results of our personal researches, strengthened by proofs, have already condemned it.

AMBLYSTEGIUM COMPACTUM IN BRITAIN.

By H. N. Dixon, M.A., F.L.S.

Brachythecium densum Jur. is a little-known continental moss, and a glance at the synonymy given by Limpricht (*Laubmoose*, iii. p. 136) will, I think, justify the statement that it has been at least equally little understood. Gathered by Arnold in Franconia, Bavaria, and South Tyrol, in 1864, and described by Milde in the same year under the name of *Amblystegium densum*, it has already run through pretty nearly the whole gamut of the Hypnaceous genera or sub-genera. I hope to show in this article that the synonymy is not yet exhausted, and that the plant must be referred to *A. compactum* (C. M.) Aust., a well-known North American species, hitherto only once recorded on this side of the Atlantic. Before giving the grounds on which this assertion is made, however, I may describe the discovery of the plant in Great Britain. It is a curious coincidence that *B. densum*, previously unknown in Britain, should have been collected in four separate localities during 1899, within a month, each gathering being made entirely independently, and, indeed, without any expectation at the time of gathering that the plant was of special interest.

In the early part of July I was visiting the north of Sutherland, and stayed for two or three days at Durness, attracted in part by the fine scenery of Cape Wrath, and in part by the striking feature of an outcrop of limestone on the coast, one of the results of which is the very remarkable subterranean watercourse known as the Smoo Cave. Taking advantage of the occasion (rare for the past summer) of a wet day to explore the cavern, I found little of botanical interest within the cave itself but a small quantity of var. *depauperatum* of *A. serpens*, and some quantity of a somewhat similar but more densely growing moss which I took to be probably another form of the same species, presenting, however, some slight and hardly definable differences; this was gathered and put away, nor was it further examined until late in the following month.

From Durness I proceeded to Inchnadamph, where I was to meet Messrs. W. E. Nicholson and E. S. Salmon; on the following day, while awaiting their arrival, I explored a short distance up Glen Dubh, where the R. Traligill for the space of half a mile or so plays hide and seek with the upper air in a way familiar to those who know the carboniferous limestone of the Craven district of Yorkshire and similar formations. In a series of cavities in the limestone, at a spot where the stream finally emerges, I gathered, in company with a fine growth of the rare and very beautiful *Weisia calcarea* C.M., a small quantity of what I took to be probably *A. Sprucei*. This too was put away for examination at home.

Early in August, immediately upon my return south, I spent a week or so in Derbyshire. While walking through Dovedale I gathered a small quantity of what seemed to be a small *Amblystegium*, which I brought home, without giving any further thought

to it at the time. It was with some surprise that when I came to go through my Scotch gatherings, and later on my Derbyshire ones, I found that these three plants were identical, and, moreover, did not seem to agree with anything I knew. The very fact, however, of the triple occurrence seemed to preclude the probability of the plant being anything out of the common, and I could only suppose it to be some form of a common moss whose identity had eluded me on account of its unusual habit. I sent a specimen to Prof. Barker, thinking that he might have observed it in his study of the Derbyshire mosses, which, however, was not the case. He pointed out, however, the resemblance to the description of *B. densum* Juratz. in Limpricht's *Laubmoose*, and on comparison I felt convinced of the correctness of the suggestion. Subsequently Dr. Braithwaite, with his wonted generosity, sent me specimens of the continental plant, including a fragment of the original plant gathered by Arnold in Franconia, and the identity of our moss with this was at once established.

In looking through our Inchnadamph collections some months later, Mr. Nicholson detected it from still another locality—among *A. Sprucei* gathered in shady limestone caves in Allt-nan-Uamh, on the side of Breabag. And, if the truth must be told, on reference to my own specimens from that locality, I found that the bulk of what I had put away as *A. Sprucei* was in reality the rare moss under notice!

It will be observed that there is a close, indeed an almost exact similarity in the character of all the four stations described; in each case the moss was growing in a shady cave or recess in limestone rock, precisely the habitat in which *B. densum* is found on the Continent as described by Limpricht:—"Kalkmoos! Auf dem Boden und an den Wänden der Kalkhöhlen . . . .;" thus agreeing very closely in this respect with *A. Sprucei*, which, however, is not confined to such localities.

I now proceed to establish the identity of our European moss, *Brachythecium* or *Amblystegium densum*, with the North American *A. compactum*. The latter plant, it may be remembered, has been recorded from Auvergne by Frère Héribaud (v. *Rev. Bryol.* 1896, p. 112, and *Muscinées d'Auvergne*, 1899). During the past autumn I received from M. Lachenaud, of Limoges, a specimen of this moss, gathered by Frère Héribaud in Auvergne, in August, 1895. An examination of this specimen at once convinced me that it was really identical with *B. densum*, with which indeed it agreed in every respect. The habitat, too—"sur les parois d'une grotte"—and the substratum, a calcareous tufa, exactly fitted in with *B. densum*, while the North American *A. compactum* is usually found on decayed trunks and the foot of trees by water. Having occasion to write to Dr. Cardot about this time, I asked him if he would kindly examine any specimens he might have of the Auvergne plant, and see whether, in his opinion, it was not actually referable to *B. densum*. Dr. Cardot replied that, upon examination, he quite agreed with me in that opinion, but that after comparison with several North American specimens of *A. compactum* he could not

separate the two, and was led to conclude that *A. densum* Milde and *B. densum* Juratz. must be held to be simply synonyms of *A. compactum* Aust.

Not possessing at that time any authentic specimens of the North American plant, I felt some difficulty in accepting this position, and ventured to point out to Dr. Cardot some of the apparently important distinctions between the two plants as described, the one by American, the other by European writers. In reply, Dr. Cardot obligingly sent me specimens from all the *A. compactum* he possessed from North America (including *A. subcompactum* C. M. & Kindb. and *A. dissitifolium* Kindb.), and upon examination of these I could not doubt for an instant the identity of these plants with all the European plants which I had seen that have passed under the various names of *B. densum*, *A. cryptarum*, &c. (see synonymy, given below).

There remained, however, several points to be cleared up, and it will be most convenient to tabulate the chief differences that appear under the various descriptions, and deal with them *seriatim*. For *A. compactum* I have consulted mainly the very full description given by Cheney, in his admirable study of the North American species of *Amblystegium* (*Bot. Gaz.*, Oct. 1897). For *B. densum* I have taken the descriptions given by Milde and Limpricht. In addition to various specimens of both the European and the American plant in my herbarium, I have had the opportunity, through the kindness of the authorities at Kew, of examining the type specimen, in Hooker's Herb., of *H. compactum* C.M., and this has materially aided me in forming the conclusions arrived at.

A. compactum.	*B. densum.*
1. *Stem section.* Central strand small, 3 to 6 μ in diameter, of 4 to 7 rows of cells; all tissues having thin walls.	1. Central strand obsolete or wanting. Cortical cells thick-walled.
2. *Brood-filaments.* Not described.	2. Nerve of leaf frequently producing hyaline or orange-brown rhizoid filaments from the back.
3. *Inflorescence.* Autoicous.	3. Dioicous. Male flowers and fruit unknown.
4. *Perichætial bracts.* Costa narrow, percurrent or excurrent.	4. With short nerve.
5. *Habitat.* On decayed wood at the bases of trees in swamps or along streams.	5. On calcareous rocks, in caves and hollows of walls.

1. *Stem section.* This is clearly a character subject to variation according to the degree of development of the part chosen. The description by Cheney doubtless refers to the strongest and most highly organized stems, and between these and the smaller branches, in which the central strand is often quite wanting, there are no doubt all stages of development. Thus, in a fairly strong secondary stem of *A. compactum* (Madison, Wisconsin, *leg.* Cheney and True),

I find the central strand quite unrepresented by any special cells, and only defined, or apparently defined, by the cells of the ground tissue narrowed and converging to a point in the centre of the stem. This would seem to agree precisely with the meaning intended to be conveyed by the somewhat ambiguous term "obsolete," as applied to *B. densum*.

As regards the cortical cells, the term "thin-walled" is obviously a comparative one. No doubt there is no tissue in the stems of *A. compactum* which in the absolute thickness of the cell-walls would compare with the ordinarily so-called "thick-walled" cells of more robust and more highly developed mosses. But in the specimen of *A. compactum* just referred to, as well as in others which I have examined, the walls of the cortical cells are very decidedly thickened in comparison with those of the ground tissue; Limpricht's description of the stem-section of *B. densum* agrees in fact precisely with what one here finds. In short, when stems of similar dimensions are chosen, I can detect absolutely no difference between the sections of the American plant and the European *B. densum*. It may be remarked that the American plant varies somewhat in point of robustness, and as far as I am aware the European plants so far known all belong to the smaller forms, which, taken in conjunction with the above facts, fully, I think, explains the apparent discrepancy.

2. The curious "brood-filaments" which appear on the back of the leaves of *B. densum*, and are rightly given by Limpricht an important place in the diagnosis of the species, are not mentioned in any description of *A. compactum* so far as I am aware. They are, however, present, not only in the Auvergne plant, but in every specimen of the American *A. compactum* that I have examined, including the type specimen in Hooker's Herbarium. I look upon this character as a most important argument in favour of the identity of the two plants.

3. *Inflorescence.* This undoubtedly presents the most serious difficulty in the case. I believe, however, it is sufficiently accounted for by the following considerations. None of the descriptions of *A. compactum* to which I have had access give any account of the male flowers, or, indeed, make mention of them, beyond the simple statement that the species is autoicous; and in so small a species it may be taken for granted that the male flowers are small and inconspicuous, even when present. Now Kindberg, in his description of *A. dissitifolium* (which is without any doubt only a form of *A. compactum*), writes, "probably dioicous; only male flowers found." In view of this paucity of description of the male flowers in *A. compactum*, and of the fact that the species of *Amblystegium* are so generally autoicous, one may be pardoned for suggesting that the existence of the male flowers has probably been usually taken for granted, and that dioicous forms, such as that described by Kindberg, need not necessarily be infrequent.

The European plants, too, as has been already mentioned, represent a small and very frequently a markedly undeveloped form, and it is not unreasonable to suppose that this may, to a certain extent,

account for a failure of development in respect of the reproductive organs. In support of this a statement of Berggren's may be cited (*Musci et Hepaticæ Spetsbergenses*, p. 35) as to the autoicous *Oncophorus virens* Brid. He states that the fruit of that moss is only sparingly produced, while the flowers are frequent; and that when these are poorly developed the *male flowers are wanting*.

A strong confirmation of the slight value to be attached to the character of the inflorescence, in the present case, is found in the fact that Wilson, in one of his sets of Drummond's *Musci Amer.*, has made the following manuscript note: "188, Dr. M. Am. *Hypnum compactum* Br. & Sch. operc. conical-acuminate, almost rostellate; *dioic.*" It is clear, I think, that these divergent views as to the inflorescence of the American plant by such high authorities fully justify the supposition that the plant is at times dioicous, or else (though I think this is less probable) that the disposition of the inflorescence is sometimes so difficult to detect that the European plant may have been described as dioicous in error, the male flowers having been overlooked.

4. *Perichætial bracts.* I have examined a perichætium of the type specimen in Herb. Hook., belonging to a well-developed though immature fruit, and though without dissection, which appeared undesirable, I could not determine the exact length of the nerve, I was able to prove without any doubt that in two of the inner and larger bracts it does not reach above two-thirds, and in one at least of them not above half the length of the bract. Whether or not, therefore, in general, the nerve, as stated by Cheney, is "percurrent or excurrent," this cannot be held a constant specific character, since it is wanting in the type specimen.

5. *Habitat.* This would not of course be held in itself to form a conclusive character, but it seemed of some importance in view of the fact that *all* the known European stations (I believe) are on limestone rock or tufa, while the description of the habitat of the American plant as arboreal is usually unqualified. However, Macoun (*Cat. Canad. Pl.* vi. 221) gives under *A. compactum* various localities, including such stations as "on the ground in moist places," "on rocks" (two localities), "on the tufa mounds at Banff, Rocky Mts." *A. dissitifolium* Kindb. is described from two localities, in each case "on flat limestone rocks which receive the dripping of water." And *A. subcompactum* is recorded from "bases of trees, Clinton, and wet rocks near the whirlpool, Niagara Falls." Thus the apparent difference in habitat is quite cleared away.

I may add that an examination of *A. dissitifolium* Kindb., and *A. subcompactum* C. M. & Kindb., the former a specimen from Owen Sound, ex herb. Kindberg, the latter a specimen from Montana, also authenticated by Kindberg himself, has convinced me that Cheney, Cardot, and others, are incontestably correct in referring both plants to *A. compactum*. The differences at best are slight and elusive, and some of the characters as given in the description are by no means borne out by the specimens. *A. subcompactum*, which is described as having thicker stems, and longer and larger

leaves than *A. compactum*, is by no means so robust as some of the forms of the latter species, very little indeed, if at all larger than the type. "The asymmetric capsule, curved in the younger state, at least doubly greater," is the only other character given. Now, in one of the specimens of No. 188 Drumm. Musc. Amer. in the Kew Herbarium (*H. serpens* var. *compactum*) the young immature capsules are similarly curved and asymmetric, and the ripe capsules are every whit as large as, indeed slightly larger than, in Kindberg's specimen!

In habit *A. compactum* closely resembles the more slender forms of *A. serpens*, or even of *A. Sprucei*, and there is no doubt that it has been passed over, on more than one occasion, for one or other of these plants. The resemblance to *A. Sprucei* is accentuated by the fact that the two mosses grow in exactly similar habitats, and have been found more than once growing in company. It is quite possible that a careful search of herbarium specimens of *A. Sprucei* may reveal the presence of the species under notice, which will be distinguished by the larger leaves, not at all appressed to the stem, divergent and usually somewhat homomallous when dry. But, although it has given rise to so much confusion, and although in the field *A. compactum*, at least in the barren state, is with difficulty separated from some of the smaller species of *Amblystegium*, &c., yet under the microscope it is readily recognizable by certain salient characters which may be briefly noted. The well-developed nerve, broad in proportion to the size of the leaf, and percurrent, or at least running well up into the slender acumen; the sharply denticulate margin, especially towards base; and the constant presence, in greater or less quantities, of jointed rhizoids or protonemal threads arising from the nerve of many at least of the leaves, are the most marked of these characters in the barren state. The nerve, in particular, at once separates it from *A. serpens* and all the species of that genus with which it is likely to be confounded; while the sharply toothed leaf-margin as readily distinguishes it from *Eurhynchium tenellum*. It is a much smaller plant than *A. varium* Lindb., and the areolation is entirely different.

The "brood-filaments" usually consist of very slender branched rhizoidal jointed threads, hyaline and chlorophyllose, or brownish, smooth or rarely punctulate; occasionally they are much stouter, and are then usually straight and unbranched. The whole plant, moreover, and especially the leaves, are remarkably fragile; and according to Limpricht the leaf-point itself occasionally becomes elongated into a filiform articulate thread.

Cheney describes and figures the outer cell-wall of the marginal cells at mid-leaf as markedly wider than the internal cell-walls; I have, not, however, been able to verify this character on the type specimen, or on others of the North American plants which I have examined.

The nerve has a curious tendency to disappear or become indistinct about the middle of the leaf, becoming stronger again in the acumen. Although wide and somewhat thick, it is not as a rule very clearly defined, and it varies considerably in width and

distinctness in different leaves on the same stem. There is some slight variation, too, in the width of the cells, and in the degree of acumination of the leaves. In spite of these variations, however, *A. compactum* is not really a very variable plant. The slight differences, for instance, that occur in the width of the cells do not amount to much, and in those plants which have the cells mostly wider than in the type there are usually to be found stems on which the leaves have cells of about the ordinary dimensions. The extreme range of variation in the dimensions of the cells is no greater than in most species of *Amblystegium*, and is, indeed, much less than in several of the species. In one direction, however, it exhibits a decided tendency to departure from the type; like *Heterocladium heteropterum* (and probably not unconnected with the similarity in the habitats of the two plants), it occasionally runs into a filiform state, with the stems stoloniform or with extremely minute, ill-developed leaves, as in the var. *fallax* Milde (var. *cavernarum* Mol.) of the *Heterocladium*. In this condition (under which it received the names of *A. cryptarum*, &c.), the cells become shorter, giving a laxer appearance to the areolation. But even in the most slender forms, stems can generally be found bearing larger leaves more nearly approaching the normal type.

I add a synonymy, and a short description of the species. I may add that our British plant will be described and figured by Dr. Braithwaite, in a supplement to the third volume of his *British Moss Flora*.

AMBLYSTEGIUM COMPACTUM (C.M.) Aust. Musc. App. 372 (*nomen*).*

SYN.—*Hypnum serpens* var. *compactum* Hook. in Drumm. Musc. Amer. ii. No. 188 (1828).

H. compactum C. M. Syn. Musc. Frond ii. p. 408 (1851). Sull. Icon. Musc. 201, tab. 123 (1864). Lesq. & James, Man. p. 375 (1884).

A. serratum B. & S. Bry. Eur. Amblystegium, p. 11 (1853), in note.

Stereodon compactus Mitt. in Proc. Linn. Soc. viii. p. 43 (1864).

A. densum Milde, Bot. Zeit. 1864, p. 21 (Beilage).

Rhynchostegium tenellum var. *brevifolium* Lindb. Rab. Bryoth. Eur. No. 750 (1864).

A. cryptarum Sauter in sched.

A. serpens var. *cryptarum* (Sauter) Arnold in Rab. Bryoth. Eur. No. 841 (1865).

Brachythecium densum Juratz. in Rab. Bryoth. Eur. No. 995 (1867). Limpr. Laubmoose Deutschl. &c. iii. p. 136 (1897).

Hypnum densum Milde, Bryol. Siles. p. 360 (1869), (non C. M. Syn. ii. p. 335).

A. compactum Aust. *l. c.* Macoun & Kindb. Cat. Canad. Pl. vi. p. 221 (1892). Cheney in Bot. Gaz. xxiv.p. 262 (1897). Limpr. Laubmoose iii. p. 331 (1898). Héribaud, Muscinées d'Auvergne (1899).

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* The American plant is usually cited as *A. compactum* Br. & Sch. I do not know what gave rise to this, but it appears to be a pure error.

A. dissitifolium Kindb. in Macoun & Kindb. *l. c.* p. 220 (1892).
A. subcompactum C. M. & Kindb. in Macoun & Kindb. *l. c.* p. 221 (1892).

In thin, dull green patches, pale and yellowish within, usually dense, but at times more straggling, with the habit of *A. serpens* or *A. Sprucei*. Plants very fragile. Stems *slender*, sometimes filiform and stoloniform, slightly radiculose, creeping, irregularly branched. Stem tissue loose, central strand small or wanting, cortical cells smaller, in 1–2 layers, with thicker walls, yellowish. Leaves somewhat spreading, *usually secund and pointing upwards on the branches*, narrowly decurrent; stem-leaves ovate-lanceolate, gradually tapering to a variable, but *usually rather wide point*, 0·72–1 mm. in length, *more or less sharply denticulate throughout, especially towards base*. Nerve *broad* but not well defined, *reaching high into the acumen or percurrent*, at times becoming indistinct in mid-leaf and reappearing above; *frequently with jointed filaments or rhizoids from the back*. Branch-leaves narrower, often very small. Cells linear-rhomboid, thin-walled, chlorophyllous, 4·5–8 μ in width, and 5–9 times as long (shorter in the smaller leaves), towards base shorter, at angles *shortly rectangular to quadrate, not distinctly enlarged*, nor forming auricles. Autoicous and ? dioicous. Seta short. Capsule small, *nearly symmetric, erect or slightly inclined*, with a distinct neck. Lid conical, apiculate.

Distr.—North America: Canada, U. States. Europe: Sweden, Central Europe, Spain, Central France. Great Britain: Smoo Cave, Durness, Sutherland, July 12th, 1899 (*H. N. Dixon*); Glen Dubh, Inchnadamph (*H. N. Dixon*); Allt-nan-Uamh, Inchnadamph (*Nicholson, Salmon & Dixon*)—all in v.-c. 108; Dove Dale, Derbyshire, v.-c. 57 (*H. N. Dixon*).

Note.—As slightly strengthening the argument as to the inflorescence, it may be added that Sullivant (*Icones*, p. 201) in describing *H. compactum* merely says, "Flores ex cl. Müller monoici."

MERIONETHSHIRE LICHENS.

By William Henry Wilkinson.

In the following list, the towns named include the districts around, within walking distance.

Lichina confinis Ag. On slate-rock, shore, Aberdovey.
Collema furvum Ach. On stone wall, Aberdovey.—*C. flaccidum* Ach. On trees, Aberdovey.
Calicium hyperellum Ach. On trees, Aberdovey, Corwen.
Sphærophoron coralloides Pers. On rocks, Aberdovey, Dolgelly,
Bæomyces rufus DC. On ground, Corwen.
Cladonia cervicornis Schær. On rock, Aberdovey, Blaenau Festiniog.—*C. pyxidata* Fr. Aberdovey, Bala, Beddgelert, Cader Idris, Corwen, Dolgelly.—*C. gracilis* Hoffm. Dolgelly.—Var. *chor-*

dalis Leighton. Corwen.—*C. furcata* Hoffm. Corwen.—*C. digitata* var. *macilenta* Leighton. Blaenau Festiniog, Cader Idris, Dolgelly. *C. deformis* Hoffm. Dolgelly.

Cladina rangiferina Nyl. Aberdovey, Corwen, Dolgelly.

Stereocaulon paschale Fr. In fruit, slate-rock, Blaenau Festiniog. —*S. denudatum* Floerke. In fruit, Dolgelly, Minffordd Junction.

Usnea barbata Fr. Beddgelert, Dolgelly. — Var. *hirta* Fr. Dolgelly.—Var. *ceratina* Schær. In fruit, Barmouth.

Evernia prunastri Ach. Corwen, Dolgelly.

Ramalina calicaris Fr. On trees, Aberdovey.—*R. farinacea* Ach. On trees, Aberdovey, Corwen.—*R. fraxinea* var. *ampliata* Ach. On trees, Corwen.—*R. fastigata* Ach. On trees, Aberdovey, Corwen.—*R. cuspidata* Nyl. Rocks, Aberdovey.—Var. *crassa* Del. Rocks, Aberdovey.—*R. scopulorum* var. *subfarinacea* Nyl. Rocks, Aberdovey.

Cetraria aculeata Fr. Aberdovey.—Var. *muricata* Ach. Rocks, Blaenau Festiniog.

Platysma commixtum Nyl. Rocks, Aberdovey.—*P. glaucum* Nyl. Barmouth.

Peltigera canina Hoffm. On turf, Aberdovey, Barmouth, Corwen, Dolgelly.—Var. *crispa* Whlnb. Bala.—*P. rufescens* Hoffm. Aberdovey, Bala, Corwen, Dolgelly.—f. *prætextata* Floerke. Bala.—*P. malacea* Fr. Barmouth.—*P. spuria* Leight. Aberdovey.—*P. polydactyla* Hoffm. Aberdovey, Barmouth, Corwen.—*P. horizontalis* Hoffm. Aberdovey.—*P. scutata* Leight. Bala.

Stictina limbata Nyl. Trees, Barmouth.—*S. fuliginosa* Nyl. Barmouth, Dolgelly.

Parmelia caperata Ach. Aberdovey, Beddgelert, Dolgelly.—*P. olivacea* Ach. Corwen, Dolgelly.—Var. *exasperata* Leight. In fruit, Aberdovey.—*P. stygia* Ach. In fruit on rock, Aberdovey. *P. physodes* Ach. Aberdovey, Dolgelly.—*P. perlata* Ach. Aberdovey, Dolgelly.—*P. tiliacea* Ach. Dolgelly. *P. fuliginosa* var. *olivacea* Leight. Aberdovey, Corwen.—*P. conspersa* Ach. Aberdovey.—Var. *isidiata* Leight. Blaenau Festiniog.—*P. sinuosa* Ach. Aberdovey. — *P. saxatilis* Ach. Aberdovey, Barmouth, Beddgelert, Corwen, Cader Idris, Dolgelly.—Var. *sulcata* Nyl. Aberdovey.—Var. *omphalodes* Fr. Aberdovey, Cader Idris.—Var. *furfuracea* Schaer. In fruit, Aberdovey, Corwen.

Physcia parietina De Not. Aberdovey, Bala, Corwen.—*P. pulverulenta* Nyl. In fruit, Aberdovey, Bala, Corwen.—Var. *pityrea* Nyl. Bala.—Var. *venusta* Nyl. Aberdovey.—*P. subdetersa* Nyl. In fruit, Bala.—*P. stellaris* Nyl. Aberdovey, Corwen.—Var. *leptalea* Nyl. Aberdovey, Corwen.—*P. stellaris* var. *cæsia* Leight. Corwen. —Var. *tenella* Nyl. Aberdovey.—*P. aquila* Nyl. Aberdovey.

Umbilicaria cylindrica Dub. Arran Mowddwy.

Squamaria saxicola Nyl. Aberdovey.

Placodium murorum Nyl. Corwen.—*P. citrinum* Nyl. Aberdovey, Bala.

Lecanora squamulosa Hook. Rock, Aberdovey. — *L. sarcopis* Leight. Rails, Corwen.—*L. atra* Ach. Rocks, Aberdovey, Corwen. —*L. subfusca* Ach. Dolgelly.—Var. *allophana* Ach. Trees, Corwen. —Var. *argentata* Ach. Trees, Corwen.—Var. *itumescens* (Rebent.)

Trees, Corwen.—Var. *atrynea* Ach. Trees, Aberdovey, Corwen.—*L. parella* var. *pallescens* (L.). Trees, Corwen; rocks, Bala.—*L. ferruginea* var. *saxicola* Leight. Rocks, Aberdovey.—Var. *festiva* Leight. Rocks, Aberdovey.—*L. cerina* Ach. Trees, Corwen.—*L. ventosa* var. *lepadolemma* Ach. Cader Idris.

Pertusaria communis DC. Trees, Aberdovey, Corwen, Dolgelly.—*P. leioplaca* Schaer. Trees, Corwen.

Lecidea endomelæna Leight. Rocks, Blaenau Festiniog.—*L. flexuosa* Nyl. Trees, Corwen.—*L. parasema* Ach. Trees, Corwen. *L. rivulosa* Ach. Rocks, Blaenau Festiniog.—*L. fusco-atra* Ach. Slate-rocks, Blaenau Festiniog.—*L. contigua* Fr. Rocks, Cader Idris.—Var. *limitata* (Leight.). Rocks, Cader Idris.—Var. *umbonata* (Leight.). Rocks, Barmouth.—*L. subumbonata* Nyl. Rocks, Aberdovey.—*L. disciformis* Fr. Corwen, Dolgelly.—*L. atro-badia* Nyl. Rock, Aberdovey.—*L. myriocarpa* var. *chloropolia* (Fr.). Aberdovey.—*L. citrinella* Ach. Bala.—*L. geographica* Fr. Rocks, Aberdovey, Blaenau Festiniog, Corwen.—Var. *contigua* Schaer. Barmouth, Cader Idris.

Opegrapha atra Pers. Trees, Corwen.—*O. Turneri* Leight. Trees, Bala.

Arthonia astroidea Leight. Trees, Corwen.

Graphis inusta var. *divaricata* Leight. Dolgelly.

Verrucaria gemmata Ach. Trees, Corwen.—*V. punctiformis* Ach. Trees, Aberdovey.—*V. nitida* Ach. Trees, Aberdovey, Barmouth.

PLANTS OBSERVED IN WEST MAYO, JUNE, 1899.

By Rev. E. S. Marshall, M.A., F.L.S.

The excellent Railway Hotel at Mallaranny served as my head-quarters, expeditions being made by rail to the other places mentioned. I devoted the first part of a ten days' stay to lowland work, as the heat was great, and I was not in good walking condition; then the weather unfortunately broke, and a contemplated exploration of the mountain-range south of Nephin Beg had to be abandoned. Although the flora of the district is not very rich, I am sure that a more extended search would add considerably to the number of species observed (approximately, four hundred and forty). Mr. R. Lloyd Praeger kindly drew for me a sketch map, showing the geology—quartzite and mica-schist, old red sandstone, carboniferous sandstone, and carboniferous limestone; this was of great value as a guide. The bramble-gatherings were determined by Rev. W. Moyle Rogers; those apparently new to the vice-county are starred.

Ranunculus Drouetii Godr. Castlebar, and near Mallaranny.—*R. sceleratus* L. Salt-marsh near Newport.—*R. scoticus* mihi. Abundant on the south side of Sraheens Lough, Achill Island; here *Eriocaulon* replaces the *Subularia* of its original Scotch station. First certain Irish record. After much consideration, I believe that

Mr. Arthur Bennett is right in holding this to be only a subspecies; although its peculiarities are maintained under cultivation in ordinary garden soil, the approach to *R. Flammula* is so close that their common origin hardly admits of doubt.

Papaver Rhœas L.; *P. dubium* L.; *P. Argemone* L. These only occurred (together with *Fumaria confusa* Jord.) as casual weeds in the garden of the hotel, Mallaranny.

Nasturtium sylvestre R. Br. Roadside on the northern outskirts of Westport, in considerable quantity; obviously a somewhat unsatisfactory station, though I suspect that it is really native in the neighbourhood.—*N. amphibium* R. Br. By a slow stream running into Castlebar Lake.

Brassica Rapa L. var. *Briggsii* H. C. Watson. Abundant in fields about Mallaranny, Achill Sound, Newport, &c. — *B. alba* Boiss. Extraordinarily plentiful in cultivated land wherever I went.

Viola silvestris Reich. On limestone near Newport.

Polygala vulgaris L. Castlebar; Mallaranny, scarce.—*P. oxyptera* Reichb. Near the railway-station, Castlebar, on limestone.

Sagina apetala L. On old walls, Castlebar.

Radiola linoides Roth. In several spots about Mallaranny.

[*Prunus Cerasus* L. Roadside hedges; Newport, Mallaranny, and Achill Island, near the Sound.]

Rubus plicatus Wh. & N. Frequent; Castlebar, Newport, Mallaranny, Achill Island.—*R. pulcherrimus* Neum. Achill Island, Westport; abundant about Mallaranny. — *R. dumnoniensis* Bab.* Railway-bank about three miles from Mallaranny, towards Westport; a form tending towards *R. rhamnifolius*.—*R. Selmeri* Lindeb.* Mallaranny and Newport. — *R. rhombifolius* Weihe.* Mallaranny. *R. rusticanus* Merc. is, I think, quite scarce, except on the limestone.—*R. iricus* Rogers.* Mallaranny and Newport.—*R. ? amphichloros* P. J. Muell.* Mallaranny; very near a Wexford plant of mine, which was definitely so named by Dr. Focke. — *R. hirtifolius* Muell. & Wirtg. var. *mollissimus* Rogers.* Abundant at Mallaranny; another very hairy bramble is placed by Mr. Rogers between this and var. *danicus* (Focke). — *R. pyramidalis* Kalt. Not unfrequent near Mallaranny.—*R. leucostachys* Schleich. Only seen at Newport. —*R. Drejeri* G. Jensen.* Roadside near Newport; a very strong form.

Potentilla procumbens Sibth. Castlebar, Newport, Mallaranny; locally plentiful.

Alchemilla vulgaris L. Near Castlebar; var. *alpestris* (Schmidt), I believe, but no specimen was taken.

Drosera intermedia Hayne. Remarkably plentiful; quite as common as the other two species.

Callitriche hamulata Kuetz. Only seen once, near Mallaranny. —*C. obtusangula* Le Gall grows at Castlebar, and in streams between Westport and Newport.

Circæa lutetiana L. A hairy form grows among boulders on the coast near Mallaranny; Mr. Bennett names it as *a. umbrosa* Opiz.

Pimpinella major Huds. Castlebar. I did not observe *P. Saxifraga*, nor yet *Anthriscus sylvestris*.

Œnanthe Phellandrium Lam. Castlebar. Abundant thence eastwards as far as Balla (East Mayo).

Scabiosa arvensis L. Castlebar, on limestone.

Matricaria Chamomilla L. Roadsides and waste ground at Westport, Newport, and Mallaranny; *Artemisia vulgaris* L. also occurs at these places.

Carlina vulgaris L. On limestone about Castlebar.

[*Carduus pycnocephalus* L. Three plants on the railway ballast east of Mallaranny.]

Crepis paludosa Moench. Marshy pastures; Castlebar, Westport, and Mallaranny.

Taraxacum palustre DC. var. *udum* (Jord.). Mallaranny.

Tragopogon pratense L. Castlebar and Westport; the type.

Lobelia Dortmanna L. Frequent in the lakes westwards from Newport.

Schollera Oxycoccus Roth. Boggy ground, Murrevagh Lough, near Mallaranny.

Erica mediterranea L. extends eastwards nearly to Newport, but apparently avoids the limestone; the fruit is ripe at this season.

Centunculus minimus L. Roadside about two miles west of Mallaranny.

Erythræa Centaurium Pers. var. *capitata* Koch. Dry cliffs, Mallaranny; I suspect that this is the "E. latifolia" of Irish authors.

[*Linaria Cymbalaria* Miller. Old walls, Castlebar.]

Scrophularia aquatica L. Near Newport; the var. *cinerea* Dum., which I believe to be the usual Irish form.

Veronica agrestis L. Mallaranny.—*V. Anagallis-aquatica* L. var. *anagalliformis* Boreau. Castlebar, Newport, and near Mallaranny; type not seen.

Euphrasia brevipila Burnat & Gremli. Common; Westport, Newport, Mallaranny, Achill Island, Castlebar. — *E. curta* Fr. Plentiful on heaths near Mallaranny and Newport. Not previously recorded from Ireland, so far as I am aware; but it will surely prove to be frequent, and has probably been often confounded with *E. gracilis* Fr.

Melampyrum pratense L. var. *hians* Druce. Wet sphagnous heaths below Sraheens Lough (Achill Island), near Castlebar, and at Murrevagh Lough, near Mallaranny; flowers deep golden (or orange) yellow.

Utricularia intermedia Hayne. Mallaranny.

Lamium intermedium Fr. Oat-fields, Mallaranny. I did not notice *L. purpureum* anywhere.

Plantago Coronopus L. var. *pygmæa* Lange. Dry coast west of Mallaranny. A remarkably luxuriant form or variety (10½ in. high, by actual measurement, in my herbarium specimen) occurs in a salt-marsh near Newport; it is very hairy, suberect, the leaves pinnatifid, with narrow rachis and segments; inflorescence 1½–2 in. long.

Atriplex patula L. Achill Island, Mallaranny, Newport. No *Chenopodia* were seen.

Betula pubescens Ehrh. Mallaranny.

Salix aurita L.; *S. cinerea* L. Both frequent; but I failed to see *S. Caprea* L., and it seems to be quite a rarity in the extreme west.—*S. herbacea* L. was seen at 1000 ft., or less.

Juniperus nana Willd. Locally abundant west of Mallaranny; descending to near sea-level.

Listera cordata R. Br. Very plentiful on the hills near Mallaranny, at 1000–1200 ft.

Epipactis palustris Crantz. South-west end of Castlebar Lake, sparingly.

Orchis incarnata L. Abundant throughout the district in suitable situations, and very variable in habit. — *O. Traunsteineri* Sauter. A curious *Orchis* was found (unfortunately, only a single specimen) growing with *O. incarnata* and *O. maculata*; it was evidently distinct from both, and not a hybrid. Height 15 in.; leaves 4, pale green, erect-patent, unspotted, linear-oblong, broadest ($\frac{1}{2}$–$\frac{1}{3}$ in.) at the base, gradually and evenly tapering to the flat acuminate tip; the lowest and third $4\frac{1}{2}$ in. long, the second 5 in. Flowers rose-coloured; spur of corolla cylindric (not conical, as in *incarnata*); wings about four times as long as broad, patent, spotted; lip large, spotted, distinctly broader than long, its central lobe small, triangular, deflexed. The whole habit of the plant is very like fig. 20*b* in M. Schultze's *Orchidaceen Deutschlands*, &c., of *O. Traunsteineri* from Jena, which differs considerably in its inflorescence from the original form (fig. 20) of Kitzbühel and Zell-am-See. I do not think that this Mallaranny plant can properly be referred either to *incarnata* or *latifolia*; further search in West Ireland should show whether it is or is not constant and well-distributed. — *O. latifolia* L. var. *brevifolia* Reichb. fil. Heathy swamp, Murrevagh Lough, Mallaranny; identical with Mr. Nicholson's Waterford specimens (named by the younger Reichenbach) in Herb. Brit. Mus., and with my own from two stations on the coast near Wexford. It is small and few-flowered, with blossoms of a dull purplish red, and leaves faintly ring-spotted.

Ophrys apifera Huds. Scarce on limestone near Castlebar.

Juncus obtusifolius Ehrh. Swamp above Burrishoole Bridge, Furnace Lough, near Newport.

Sparganium simplex L. and *S. minimum* Fr. West of Castlebar.

Lemna trisulca L. Slow stream running into Castlebar Lake (south-east end).

Potamogeton polygonifolius Pourr. var. *pseudo-fluitans* Syme. Furnace Lough, near Newport, in 3–4 ft. of water. — *P. alpinus* Balb. Slow stream running into Castlebar Lake; Rossow River, between Westport and Newport; ditch draining into Derryloughan Lake, near Newport. — *P. angustifolius* Presl. Stream below the station, Westport.

Ruppia rostellata Koch. Newport.

Eleocharis uniglumis Reichb. Salt-marsh near Newport.

Scirpus cernuus Vahl, var. *pygmæus* (Kunth). Swamp, Murrevagh Lough, Mallaranny; and near Furnace Lough, Newport.

Rynchospora fusca R. & S. Plentiful on peat-bogs west of Castlebar.

Carex teretiuscula Good. Murrevagh Lough, Mallaranny; and in three distinct localities near Castlebar.—*C. limosa* L. Bog below Sraheens Lough, Achill Island; in two stations near Mallaranny, and in two near Castlebar. — *C. lævigata* Sm. Near Burrishoole Bridge, Newport, — *C. binervis* Sm. Very luxuriant (in some cases over 4 ft. high) by Lough Pollagowly, near Newport.—*C. distans* L. Abundant below Burrishoole Bridge, Newport. It was an odd experience to gather these three closely allied species and *C. Hornschuchiana* in one short walk. A hybrid between the last-named and *C. Œderi* var. *ædocarpa* And. (*flava*, var. *minor* Towns.) occurs at Castlebar and near Newport. — *C. flava* L. var. *elatior* Schlecht. (*C. lepidocarpa* Tausch). Frequent about Castlebar; Murrevagh Lough, Mallaranny. This is apparently much scarcer in Ireland than the plant which used to be misnamed '*lepidocarpa*' (var. *minor* Towns.). — *C. Œderi* Retz. Mallaranny, Newport, and Castlebar. — Vars. *elatior* And. and *cyperoides* Marsson both occur by Soileen Lough, close to Castlebar railway-station.

Phleum arenarium L. Sandhills, Mallaranny, with *Festuca rottbœlloides* Kunth.

Agrostis vulgaris With. var. *pumila* (L.). Stony moorland roadsides near Mallaranny and Newport.

Catabrosa aquatica Beauv. Mallaranny; scarce.

Glyceria plicata Fr. Newport.

Festuca pratensis Huds. and *F. arundinacea* Schreb. Near Newport; *Bromus commutatus* Schrad. was also noticed on the railway-banks.

Cystopteris fragilis Bernh. Rocks near Lough Ard, Mallaranny.

Lastræa æmula Brackenbridge. Abundant about Achill Sound and Mallaranny.

Isoetes lacustris L. and *I. echinospora* Dur. Growing together at the north-west end of Lough Pollagowly, near Newport, almost at sea-level. A few specimens looked intermediate; it is quite likely that they may hybridize, but the date (June 28th) was too early for macrospores to be properly developed.

Chara fragilis Desv. Newport; Castlebar. — *C. aspera* Willd. Castlebar Lake; Soileen Lake.—*C. polyacantha* Braun. Abundant in a pool close to Castlebar Lake, on the south side.—*C. vulgaris* L. Murrevagh Lough, Mallaranny.—*C. hispida* L. Soileen Lake.

Nitella translucens Agardh. Near Newport; fruiting freely.—*N. opaca* Agardh. Newport and Castlebar.

BIBLIOGRAPHICAL NOTES.

XXII.—Pallas's 'Flora Rossica.'

It seems that there are two states of this work extant. In the Kew Herbarium is a copy which is manifestly of the earlier state mentioned, as regards the published parts. Sixteen plates only of the total 101 bear a number printed at the same operation as the plate itself; in the ordinary edition the plates are numbered in letterpress, and the text is altered by labels pasted over the original citations. These original citations were very faulty, and, moreover, the number which followed "50" was "1" of vol. ii. In the revised version the plates were made to run consecutively in one series, except that the intercalated plate, 8B, *Cerasus fruticosa*, was not re-numbered. This additional plate was cited by Pritzel in his *Index Iconum* in its place, but overlooked in his prefixed list of works cited, and also in both editions of his *Thesaurus*, which, as regards vol. i. of the *Flora Rossica*, should read "Tomi i. pars i: 1784, p. viii. 80, tab. col., 1–8, 8B, 9–50," &c.

To complete our account of the Kew copy: three plates are uncoloured which in the usual edition are coloured in the same style as the rest. This copy also possesses the twenty-five extra plates, which were not then published, but several sets are known. Pritzel (*Thes.* ed. ii. p. 239) cites them from a copy in the Royal Library at Berlin, giving 1815 as the date of issue. Trautvetter, whose means of knowing the actual facts were undoubted, states (*Act. Hort. Petropol.* vii. 1880, p. 212) the date as 1831. These extra plates are bound in the same order as cited by Pritzel, and therefore the same as in the Berlin copy. They seem very little known, and I therefore append a list in the order in which they occur, and as named on the plates.

1. *Isopyrum fumarioides; Helleborus trifolius*
2. *Lycopus pinnatifidus*
3. *Hieracium sabaudum*
4. *Dryas geoides*
5. *D. octopetala*
6. *D. pentapetala*
7. *Cnicus cernuus*
8. *Hyosciamus physalodes*
9. *Stachys lanata*
10. *Cacalia hastata*
11. *Dracocephalum pinnatum*
12. *D. grandiflorum*
13. *D. sibiricum*
14. *Dracocephalum thymiflorum*
15. *D. nutans*
16. *D. Moldavica*
17. *D. peregrinum*
18. *Rheum nutans*
19. Id. "modulus plantæ imminutæ."
20. *R. undulatum*
21. *R. capsicum*
22. *R. palmatum* [fl.]
23. Id. [fr.]
24. *R. sibiricum*
25. *Rhei sibirici* radix

B. Daydon Jackson.

SHORT NOTES.

Dorset Euphrasias. — On July 11th, 1898, I gathered a *Euphrasia* on the coast below Pennsylvania Castle, Portland Isle, which exactly matches my Bigbury (South Devon) specimens of *E. occidentalis* Wettst., determined by Prof. von Wettstein himself. On the grassy table-land near the quarries there abounds a form of *E. borealis* Towns., agreeing well with the description of var. *pubescens* Towns. in Wettstein's Monograph. On June 1st, 1899, in the company of Rev. E. F. Linton and Mr. A. B. Jackson, I found a dwarf state of *E. curta* Fr. on the downs between Corfe Castle and Swanage. These appear to be additions to the county list.—Edward S. Marshall.

A doubtful Kentish Record.—When the third edition of Ray's *Synopsis* was searched for Kentish records, the following was noted at page 346 :—"*§ Alsinastrum Gratiolæfolio *Inst. R. herb.* 244, & Alsinastrum Gallii folio *Ibid.* Found by Mr. *J. Sherard* on boggy Ground, on the Common just by the Road from *Eltham* to *Chiselhurst.* De flore nondum satis constat." These names of Tournefort refer to *Elatine Alsinastrum* L., and this statement by Dillenius was held to vouch for the occurrence of this plant in Kent. In 1824, Sir James Edward Smith, in his *English Flora*, ii. 243–4, in his comments on his *Elatine tripetala*, a synonym of *E. hexandra* DC., says: ". . . *E. Alsinastrum*; a plant long believed, on the authority of Dillenius, to be a native of England; for who would have supposed so great a botanist could have confounded it with *Centunculus minimus*, as is proved by his herbarium at Oxford!" The matter came up again when Mr. F. J. Hanbury and the Rev. E. S. Marshall came to print the *Flora of Kent;* on reviewing the evidence, they came to the conclusion that Dillenius had blundered, and that the plant was never gathered in Kent. Thereupon I wrote to Mr. G. C. Druce, and begged him to refer to the Dillenian herbarium and so to settle the dispute. He was kind enough to do so, and in his letter stated: ". . . there is no specimen in the Dillenian herbarium to represent the plant mentioned by you, and referred to on page 346 of the third edition of the *Synopsis*. In the Sherardian herbarium, however, there is a specimen of *Centunculus* labelled by Dillenius, '*Centunculus*, Cat. Giss. p. 161, & App. Tab. 5. Syn. iii. post Expl. ? H. Abb. *Alsine palustris minima flosculis albis, fructu Coriandri exiguo*, Mentz. Pug. icon. *Anagallis spuria sive minima arvensis tetrapetaloides*, Rupp. Flor. Jen. forte *Alsine montana minima Acini effigie rotundifolia*, Pluk. Alm. p. 20, Ray Syn, iii. p. 350, n. 6, prope Chiselhurst.' This is probably the origin of Sir James Smith's reference." We must remember that the genus *Centunculus* was established by Dillenius himself in 1717; the following year he mentioned the plant in his *Catalogus plantarum circa Gissam sponte nascentium*, and in the Appendix to that work in 1719 he gave a long description of the plant, and figured the flower in detail. It must therefore be admitted that he knew the plant in its normal condition, so that, when it was first recognized by him in Kent, he placed it

on record on the last page of the introduction to the third edition of the *Synopsis*, the body of the work having been already printed off. Unluckily, he added a possible synonym to his ticket of the plant in Sherard's collection, which probably misled Smith; for the *Alsine montana minima*, etc., of Plukenet turns out to be *Arenaria trinervia* L. on the authority of a specimen labelled by Plukenet himself in Herb. Sloane, vol. xci. fol. 17, now in the British Museum (Natural History). I fear the actual plant must remain doubtful, especially as he added "De flore nondum satis constat," which seems to point to its immaturity; it was probably too young for accurate determination. In any case it is not safe to base the occurrence of *Elatine Alsinastrum* or *E. hexandra* on this unsatisfactory record.—B. Daydon Jackson.

NOTICES OF BOOKS.

Some Books on Grasses.

Handbook of the Flora of Ceylon. By Henry Trimen, continued by Sir J. D. Hooker. Part V. *Eriocauloneæ—Gramineæ.* With two Maps and Indexes. 8vo, pp. 477. London: Dulau. 1900.

Natal Plants. Vol. II. Part 1. Grasses. By J. Medley Wood. 4to. Plates 101–125, with descriptions. Durban: Robinson. 1899.

Synopsis der Mitteleuropäischen Flora. Von Paul Ascherson u. Paul Graebner. Bd. ii. Lief. 8 und 9. 8vo, pp. 145–304. Leipzig: Engelmann. Dec. 30, 1899. Price 4 Marks.

We are glad to record the appearance of the fifth and last volume of Trimen's *Handbook of the Flora of Ceylon*. It includes the three orders of Monocotyledons, *Eriocauloneæ*, *Cyperaceæ*, and *Gramineæ*, and is almost entirely the work of Sir Joseph Hooker. As Sir Joseph states, Dr. Trimen's MSS. included a list of genera and species to the end of *Cyperaceæ* only, and for the large important and difficult order *Gramineæ* he left no material whatever. But Sir Joseph, having just worked through the mass of material on which his account in the *Flora of British India* is based, was peculiarly fitted to elaborate the order for Ceylon. The one additional advantage conceivable would be the co-operation of Dr. Trimen in supplying those notes on habitat, colour, and seasons of flowering, which can only be made by an observer in the field.

In the order *Cyperaceæ* we note a departure from the arrangement adopted by Mr. Clarke in the Indian Flora, where the *Cyperus* of Linnæus and authors is broken up into the four genera *Juncellus*, *Pycreus*, *Cyperus*, and *Mariscus*. In the Ceylon Flora, presumably following Trimen's arrangement, the first three are merged in *Cyperus*, while *Mariscus* is retained. A sketch is, however, given of the genera according to Mr. Clarke's method.

In the Grasses the order of the Indian Flora is followed, save in points where later researches threw a more certain light. We

notice that Sir Joseph prefers to keep the much disputed *Panicum sanguinale* L. in the genus *Paspalum*, following Lamarck, and his own opinion as expressed in the Indian Flora.

There is a fair sprinkling of endemic species of grasses, the proportion in several well-worked genera being very remarkable. Thus, of eight species of *Arundinella* found in the island, three—*A. laxiflora* Hook. f., *A. blephariphylla* Trim. MS., and *A. Thwaitesii* Hook. f.—are endemic. *Arundinella* is a very critical genus, and it is very difficult to delimit its species. Sir Joseph remarks that *A. brasiliensis* Raddi, which in the *Flora of British India* (vii. 73) was assigned to Ceylon, has not yet been found in the island, some specimens of *A. laxiflora* having been taken for it. He regards *A. brasiliensis* as identical with *A. nepalensis* Trin., and the species, therefore, as common to both Old and New Worlds. From an examination of Raddi's specimen at the British Museum, we are inclined to think that the Asiatic specimens are not conspecific with the South American, the spikes of which have a different look and conspicuously smaller spikelets. *Dimeria* is another genus remarkable for its peculiar development in the island. Of the seven species found, four are endemic, and a fifth is represented by two endemic varieties. *Garnotia* is a still more striking instance, six out of seven species being found only in Ceylon. To one, *G. tectorum* Hook. f., Sir Joseph appends the query, "Also in China?" We can find no evidence of this distribution; the *Berghausia mutica* Munro (in Proc. Amer. Acad. iv. 362), cited as a synonym, was founded on a grass collected in Hongkong by Wright, which we consider to be only a muticous variety of the Southern Chinese *G. patula* Munro.

There are four useful Appendices. The first includes a key to the orders, genera, and aberrant species, and the diagnostic characters of the orders in the sequence adopted by Dr. Trimen. The second is an account of the Forests and Waste Lands of Ceylon, by Mr. A. F. Brown, Conservator of Forests, while the third deals with the rainfall, and is by Mr. F. Lewis, of the Forest Department. Each of these is accompanied by a map. Mr. Boulger supplies the fourth—an interesting and concise History of Ceylon Botany, arranged, in bibliographical form, under the names of those to whom we owe its elaboration, beginning with Paul Hermann and ending with Dr. Trimen, of whom, as the writer remarks, the present work is his best memorial in the history of botany in Ceylon.

The new fascicle of *Natal Plants* comprises five-and-twenty plates and descriptions of as many native grasses of the tribe *Andropogoneæ*. We envy a man who can collect grasses and have them figured on quarto plates printed on nice paper, and we also expect much from him. But we do not think Mr. Wood rises to the occasion. The value of the plates is discounted by their faint impression in a greenish ink, and they are not always good representations of the species. The first, the common and wide-spread *Imperata arundinacea*, gives the idea in its inflorescence rather of a bristly *Setaria* than of the beautiful silky-haired plant which it professes to show. Occasionally the name on the plate does not

correspond with that in the text; for instance, plate 106 bears the legend "*Erianthus capensis* Nees, var. *villosa* Stapf," but no mention of the variety is made in the text. The references are meagre and sometimes inadequate; none, for instance, is given in the case of *Andropogon schirensis* Hochst., var. *angustifolia* Stapf, or *A. hirtiflorus* var. *semiberbis* Stapf, which are described on pp. 340 and 337 respectively of the *Flora Capensis*, vol. vii., but would appear to date from the present publication. The *Flora* is, however, cited for a later plate, *A. nardus* var. *validus* Stapf. References should of course have been given throughout to the *Flora Capensis*.

Again, when a man is working in an herbarium, we must be satisfied with bare descriptions of the parts, but we expect more from the man in the field. Notes on the colour of the culms, sheaths, leaves, or spikelets, and on the general habit and habitat and the nature of the ground, give life to the description; and in the case of a colonial publication like the present add considerably to the value. Such notes are, however, very rare.

The present issue of the Synopsis of the Central European Flora comprises the subtribes *Agrostineæ* and *Aveneæ*. Its appearance in less than twelve months after the previous fascicle suggests a vigorous prosecution of a work which, when complete, will be a valuable addition to the literature of European botany. The only point which we would unfavourably criticise is the misspelling of names, which, in the case of a well-known genus like *Aira* (spelt *Aera*, p. 277), is especially irritating. The footnotes explanatory of generic and specific names form a commendable feature of the Synopsis, but no justification is given for *Aera*, which dates from Dr. Ascherson's Flor. Brandenb. 1864 (not 1804, as printed in the text), and displaces *Aira* L. Gen. Pl. 1754. Similarly, on p. 298, *Airopsis* is misspelt *Aeropsis*. We note the displacement, on ground of priority, of *Molineria* Parl. (1848) by *Periballia* Trin. (1820), and of *Corynephorus* Beauv. (1812) by *Weingaertneria* Bernhardi (1800). We were also puzzled for a time by citations such as "A. u. G. Syn. II. 301 (1899)," appended to names appearing for the first time. The reference is of course to the actual page in the part now before us, where the name appears. To say the least, the citation is unnecessary.

A. B. R.

Plant Relations: a First Book of Botany. By John M. Coulter, A.M., Ph.D. 8vo, pp. ix, 264. With 206 plates and figures. New York: Appleton. 1899.

The elementary student of botany is at present attracting some attention. Several excellent little books have been written for him in our own country within the last year or two; but these are all more or less on well-known lines, and more or less with a view to some examination syllabus. However, there is another land upon the other side of the Atlantic, where they have of late been striking out in refreshingly new methods. In this connection Professor L. H. Bailey's name at once occurs to us, and there are others busy in the

same endeavour to improve the position of botany as a means to education. "It is the purpose of the present work," Professor Coulter tells us, "to contribute another suggestion as to the method of teaching botany in secondary schools." The course consists of two parts, each representing work for half a year. The first part is presented in the book now before us, which "is dominated by Ecology, and also contains certain fundamentals of Physiology that are naturally suggested." The second book will be dominated by Morphology, but plant-structure, function, and classification will be developed together, in an attempt to face the evolution of the plant kingdom. In Professor Coulter's opinion, ecology should precede morphology, though such an order brings to the study of the former no knowledge of plant-structures and plant-groups. This disadvantage is, he thinks, outweighed by certain advantages, namely, the attainment of a proper conception of the place of plants in nature, a view which he considers of the most permanent value to those who can give but half a year to botany; and, secondly, the fact that the work suggested demands little or no use of the compound microscope, an instrument ill adapted to first contacts with nature. However, it will be quite open to the teacher to reverse the order when he is possessed of both books. Again, the book is intended to supplement three "far more important factors," teacher, laboratory, and field-work. It seeks to do this (1) by means of the text; (2) by means of the illustrations, which must be studied as carefully as the text.

Whatever may be its place in a school curriculum, we have in this very neat and nicely produced little book an excellent introduction to the study of the life-relations of plants, or ecology, as it is called. It does for the beginner what Schimper's recent *Pflanzen-Geographie* does for the advanced student of botany. When the author insists on a careful study of the illustrations, it must be with a touch of pride. Our American cousins beat us hollow in the matter of illustrations, but in this respect Professor Coulter's surpasses any book of its kind that we remember to have seen. The figures are remarkable for their beauty even more than for their abundance, which is saying much, as there is one to almost every page of text. Some we already know. Many have been borrowed, with due acknowledgment, from Kerner's *Pflanzenleben;* others from Gray; while some landscapes are taken from Schimper's recent work. But many of the best are quite new, as, for instance, a beautiful series illustrating different tree habits, on pp. 65–71, and many also in the chapter on foliage leaves (chap. iii.). In fact, so numerous and excellent are the plates in the earlier chapters that the text seems almost unnecessary. The style of the subject-matter is clear, terse, and logical. The conditions and meaning of respiration could hardly be more briefly and concisely described than on p. 34, or the function of stomata than in the paragraph a few pages later.

In the earlier chapters the life-relations of what we may term the natural divisions of a plant are successively considered, namely, those of foliage, flowers, shoots, roots, and reproductive organs. In

this arrangement the flower is considered as one kind of shoot. A special chapter is devoted to flowers and insects. Next comes a review of the individual plant in all of its relations, followed by a short account of the factors in the struggle for existence. There is also a sketch of the physiology of nutrition. The remaining five chapters deal with plant-societies, determined chiefly by the water-factor, under the titles Hydrophyte, Xerophyte, Mesophyte, and Halophyte societies. The professional botanist may perhaps complain of a certain want of continuity, but he cannot fail to admire the able manner in which Professor Coulter has put before us, in so small a compass, what he is pleased to term the preliminary guesses at the meaning of the inchoate facts of ecology.

A. B. R.

Flowers of the Field. By the late Rev. C. A. Johns, B.A., F.L.S. Twenty-ninth Edition. Entirely rewritten and revised by G. S. Boulger, F.L.S., F.G.S. London: S.P.C.K. "1899" [1900.] 8vo, cloth, pp. lii, 926. Price 7s. 6d.

Many—the present writer among the number—owe their first introduction to the systematic arrangement of our British plants to this work, which, after a popularity of nearly half a century—it was first published in 1853—now claims the support of the present generation of younger botanists in a new and complete form. Those who used the old book will remember the irritating manner in which it not only stopped short at the *Naiadaceæ*, but avoided all critical difficulties by the process of exclusion. Perhaps this was not altogether to be regretted, as the neophyte was thus driven to the more strictly scientific manuals. But as a bridge between these and more general and popular works, Mr. Johns's volume performed a useful function, and it will do this more effectually in its new form.

Mr. Boulger has included short descriptions of every species known to inhabit Britain, wisely avoiding such groups as the Brambles, Roses, and Hawkweeds, which remain in almost primitive simplicity. His nomenclature is for the most part "up to date"—or at least up to the date at which his book went to press—as to which feature opinions will no doubt differ. Considerations of space no doubt caused the entire omission of synonymy, but we think it should have been possible to add at any rate the more usual names of the genera, if only in the index: the tyro who is accustomed to hear of *Luzula*, *Capsella*, *Calystegia*, and the like, will be somewhat puzzled when he is unable to find them anywhere in the book. The omission of authorities for the names gives them a somewhat unscientific appearance. We may remark in passing that the book will have to be consulted by nomenclaturists, as it is possible that certain names—*Juncoides erectum*, for example—are here published for the first time: it is therefore important to remember that, though dated 1899, it did not appear until 1900.

Among the improvements introduced are the inclusion of all references in one index, and the reduction of the space formerly

wasted on the Linnean classification to four pages. The work has throughout been very carefully done, so far as Mr. Boulger's share in it is concerned; if the publishers had performed their part as well, they would have strong claims to the gratitude of beginners in British botany. That they have not done so is literally manifest at a glance, for it is impossible to open at any page of the book without seeing that "the resources of civilization," so far as typography is concerned, are practically non-existent for the S.P.C.K. They seem to know of only one fount of type, in the capitals of which are printed, with dull uniformity, page-headings, names of classes, orders, genera. "Black type" might never have been invented, and the reader is thus deprived of convenience arising from its judicious employment. The want of clearness is further emphasized by the fact that the name of each genus, instead of standing in a line by itself, in accordance with general practice, merely begins a line of text; and the useful practice of placing it at the head of each page has not been followed.

The mode in which the book is described is also perplexing, not to say misleading. On the cover it is lettered: "by Rev. C. A. Johns. New and Revised Edition"; but the title-page informs us it is "entirely rewritten and revised by Mr. Boulger." This being so, one wonders why Mr. Johns's name appears as the author, and why Mr. Boulger's is omitted from the cover. The Society's list mentions that "the natural order of classification has been adopted" —a statement which has naturally led the casual reviewer to mention this as a new feature of the work, whereas it has never been arranged otherwise. Considering that the book is in its 29th edition, and must therefore have already brought to the S.P.C.K. very considerable profit, it is to be regretted that they have come perilously near spoiling the ship—or is it sheep?—for a ha'porth of tar. Yet only such false economy can explain the retention of a considerable number of worn and otherwise unsatisfactory figures and the insertion of others—e. g. of the *Cyperaceæ*—which are a discredit and a disfigurement to the book. That in spite of these drawbacks it is a useful addition to British botanical literature is entirely due to Mr. Boulger.

La Nature Tropicale. Par J. Costantin. 8vo, pp. 315. With 166 figures in the text. Paris: Baillière. 1899. Price 6 francs.

This volume is Number XCIII. of the *Bibliothèque Scientifique Internationale*, published under the direction of M. Em. Alglave, a series comparable to our *International Scientific Series.* It gives a readable account of some of the conditions of plant-life prevailing in the tropics, and more especially those of the tropical forest. The illustrations are neither so numerous nor so well-produced as in similar introductions to ecology recently published in America, and they are mostly borrowed. Still they answer the purpose of helping out the text.

M. Costantin divides his subject-matter into headings, each of which comprises several chapters. Under "Préliminaires" he

gives us a few philosophic remarks, describes the first sensations produced by the virgin forest after Darwin, Agassiz, and Mr. H. M. Stanley, and tells us something of the conditions prevailing in an equatorial climate. Then follow six "Parts," entitled respectively "The Origin of the Forest," "Lianas," "Epiphytes," "Parasites," "Symbiosis," and "Influence of the Sea" (we translate the French). Twenty-one of the twenty-two chapters are ordinary Kernerism; but in the twenty-second, entitled "Le dernier cataclysme terrestre et les conceptions cosmologiques primitives de l'humanité," the author breaks new ground for the botanist. We learn that the Flood was a real flood, caused by the inroad of the sea; also interesting facts about the tree of life, which seems to have been a species more of a Benthamian than a Babingtonian kind; the phœnix, sacred beetles, polyps, prehistoric pots, and the symbol of the cross, are also touched upon by M. Costantin. It is one of those wonderful chapters which a young student reads with avidity, and remembers long after the commonplaces of the rest of the book have been forgotten.

A. B. R.

Flore Populaire, ou Histoire Naturelle des Plantes dans leurs rapports avec la Linguistique et le Folklore. Par Eugène Rolland. Tom. II. [Cruciferæ — Caryophyllaceæ.] Paris: Librairie Rolland. 1899. 8vo, pp. 266. Price 6 fr.

In our volume for 1897 (pp. 363–5) we noticed at some length the first instalment of this important contribution to the history of the popular nomenclature of plants, and on that occasion gave some notion of the scope and extent of M. Rolland's work. This second volume exhibits, as was to be expected, the same care which characterized the former, and there is no doubt that, when completed, the book will be the most extensive collection in existence of material for a history of its subject. But it is to be feared that, at the present rate of progress, few of us will be able to point to the complete work upon our shelves; for three years have elapsed between the publication of the first and second instalments, and we are only now at *Caryophyllaceæ*.

Some idea of the extent of the work may be gathered from the fact that *Brassica oleracea* occupies 50 pages, while *B. Napus* and *B. Rapa*, with their varieties, claim another 20. Extensive as it is, however, the collection cannot claim to be exhaustive. The American names might easily be increased, nor does it seem that the *Dictionary of English Plant Names* has been systematically quoted, *e.g.* the English dialect names for *Polygala vulgaris* and several of those for *Capsella* recorded in that work find no place here.

We note that the plant just referred to is entered by M. Rolland under its Linnean name *Thlaspi Bursa pastoris*, and an inspection of the volume induces us to suggest that the author might do well to consult some botanist as to his nomenclature. This is notably the case where such names as "Capparis arborescens indica Badukka" and "Capparis arborescens indica Sorda" are retained

as if specific. It would also, we think, be convenient if both genera and species were arranged in alphabetical sequence under orders and genera respectively—a change which could be adopted in subsequent volumes without interference with the plan of the book.

There is of course an abundance of interesting and suggestive matter both for philologists and folk-lorists. The former will find conclusive evidence that the popular attribution of "mignonette" to a French origin is not tenable, although it is favoured by Dr. Prior; none of the French names of *Reseda odorata* bear out the suggestion. Colmeiro gives the name "miñoneta" as Spanish, but, so far as popular nomenclature goes, it seems to be most widely spread in Italy, where the various forms "mignonetto," "mignonet," "miglionet," "mionetta," "mionet," and others, are cited for the plant.

A certain number of the names are of course mere book-creations, such as some of those cited from Nemmich as "English"; but M. Rolland has wisely refrained from citing the spurious titles which still figure as "English names" in too many of our floras, though we are not sure that he has been equally selective with regard to other nationalities. In any case, however, he is giving us a valuable and important book, which we trust he may live to carry to a conclusion.

J. B.

BOOK-NOTES, NEWS, &c.

At the meeting of the Linnean Society on March 15th, Mr. I. H. Burkill gave an abstract of a Report on the Botanical Results of an Expedition to Mt. Roraima, British Guiana, undertaken in 1898 by Messrs. F. V. McConnell and J. J. Quelch. The same travellers had made a previous journey of shorter duration to Roraima in 1894, a narrative of which had appeared in *Timehri*. The plants obtained in these two journeys have been for the most part worked out at Kew, and include a number of new species. In a somewhat elementary address, Mr. Burkill pointed out that acknowledged authorities on plant-geography had considered it probable that the vegetation of the summit of Mt. Roraima when better known would compare well with that on the Paramos of Venezuela; but this was not the case. The characteristics of the treeless Paramos were absent from Roraima; and *Bonnetia Roraimæ* —the commonest of species on the summit—attained, where sheltered, a height of 40 ft. Lower than the Paramos on the slopes of the Andes was the *Befaria* zone, and to this the upper flora of the mountain was to be ascribed; the rest of the vegetation being of a Brazilian type. Many of the plants collected were of anatomical interest; the huge mucilage-cells of the leaf of *Bonnetia Roraimæ* and the quaint pitchers of some of the *Utriculariæ* were especially noteworthy. The complex chain of mountains to which Roraima belongs includes other peaks of similar height, such as

Duida over the Upper Orinoco; but in this direction the chain terminates with the low-lying forests of the Casiquiare, which has barred immigration from the higher Andes. The additions to botanical knowledge now made may be said to emphasize the remarkable similarity which had been found to exist in the floras of Roraima and the Kaieteur Savannah.

The success which attended Miss Jekyll's *Garden and Woodland*, which we noticed last year, has induced her to publish a companion volume, *Home and Garden* (Longmans, 12s.). This, contrary to what is often the case with sequels, is as interesting as its predecessor—a fact due to the gift which Miss Jekyll possesses in no ordinary degree of making the reader's interests identical with those of the author; she takes us into her confidence about the building of her house and the making of her garden, and we find ourselves sharing her anxieties and enthusiasms and agreeing—rarely disagreeing—with her tastes and prejudices. The flower-lover has not such exclusive possession of this book as he had of its predecessor, and if the chapter on "The Home Pussies" were not so delightfully written and (as is the rest of the book) so charmingly illustrated, it might be thought a little out of place; but the delight of Miss Jekyll's style would make us willing, and even thankful, to accept her account of anything she chose to write about.

So much has been published about the late John Ruskin, and his connection with Botany was so slight, that it seems hardly necessary to refer to him at length in these pages. One work of his—*Proserpina: Studies of Wayside Flowers*—may, however, perhaps claim mention, especially as it contained suggestions for a new system of nomenclature, which was noticed in this Journal for 1880 (p. 280), and several new names—happily, not entitled to adoption—which may some day find their way into a synonymic list. In the very first chapter the author, led hopelessly astray by the popular name of *Tillandsia usneoides*, arrives at the conclusion that "the pineapple is really a moss; only it is a moss that flowers but 'imperfectly'"! Ruskin undoubtedly did much to stimulate a love for plants, and at one time entertained the notion of publishing a work which should contain accurate drawings of every British species—this, he maintained, had never been done. He mentioned this to us on one of two visits which he paid to the Department of Botany—the first to see Bauer's drawings of Australian plants, which he commended on account of the amount of labour and pains which they manifested; the second, to see again the very beautiful drawings which Jacquin sent to Dryander, which had been shown him on the former occasion, and which elicited his unqualified admiration.

The Trustees of the British Museum have published in a handsome volume (price £1) *A Monograph of Christmas Island* (*Indian Ocean*), the outcome of a visit of ten months by Mr. C. W. Andrews in 1897–8. The botanical portion has been undertaken by Mr. E. G. Baker (Polypetalæ and Gamopetalæ), Dr. Rendle

(Apetalæ and Monocotyledons), Mr. Gepp (Ferns and Mosses), and Mr. Blackman (Lichens and Fungi). The following new species are described:—*Pittosporum nativitatis*, *Acronychia Andrewsi*, *Colubrina pedunculata*, *Saprosma nativitatis*, all of E. G. Baker; *Peperomia Rossi*, *Cryptocarya nativitatis*, *Laportea Murrayana*, *Panicum Andrewsi*, all of Rendle; and *Geaster Andrewsi* Blackman: plates are given of the *Pittosporum* and *Panicum*. We observe that the new commemorative names have been compelled to conform to the zoological practice and are spelt with a small initial. The tabular "list of species" (pp. 313–317), showing distribution in accordance with the districts recognized by zoologists, would have benefited by revision by one of the botanists named, both as to spelling of names and details of distribution.

The *Daily Mail* has long been pre-eminent in the domain of popular science, and we have more than once extracted for the delectation of our readers information which, although not true, was certainly new. The following article, headed "Long Life in Seeds," appeared in the issue for March 31st, and marks the highest flight of imagination yet attained in the direction of science. Considering the enormous circulation of the *Mail* among the less educated classes, it is to be regretted that it should disseminate rubbish of this kind:—

"An extraordinary fact, which is calculated to cause a stir in botanical circles, has been observed by Colonel Thompson during the past two years, and is now made public for the first time. A little plant called Pilea microphylla has constantly come up in the pots in which jadoo fibre has been used, and as this plant is a native of the West Indies and tropical America, it is clear that it comes from the moss, which is obtained solely from Yorkshire, and which is used in the preparation of jadoo, though in this climate the pilea cannot grow in the open air. The surmise of the colonel is that the seed was deposited in the moss countless ages ago when a tropical climate prevailed here, similar to what it was in the Mid-Eocene period, when the Celtis or nettle tree, the bread fruits, and the giant cacti flourished in Britain. If his conjecture is correct, we have some extraordinary testimony in favour of the great vitality of seeds, far surpassing anything that has been advanced in this connection before, including that furnished by the sprouting of the 'mummy wheat.' The Pilea genus is a most extensive one, and is well known to be broadly scattered over and confined to the tropics. It is a curious coincidence that the temperature at the period referred to, when the fan palms flourished to perfection and tropical forests at Bournemouth overlooked a lagoon, has been put at 70 deg. by eminent geologists; and it is at this same temperature that the pilea seeds were observed to have been awakened from their long sleep. Its appearance unexpectedly in the Yorkshire moss when potted and placed in the hot-house is certainly most interesting, and the subject is sure to be debated by scientists during the next few months."

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SENIOR ASSISTANT, DEPARTMENT OF BOTANY, BRITISH MUSEUM (NATURAL HISTORY)

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THE JOURNAL OF BOTANY was established in 1863 by Dr. Seemann. In 1872 the editorship was assumed by the late Dr. Trimen, who, assisted during part of the time by Mr. J. G. Baker and Mr. Spencer Moore, carried it on until the end of 1879, when he left England for Ceylon. Since then it has been in the hands of the present Editor.

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The bound volumes for 1896, 1897, 1898, and 1899 can be had at the usual price, £1 1s. each; also covers for the 1899 volume (price 1s. 4d. post free).

R. Morgan lith. West, Newman imp.

A Strobilanthopsis hirsuta. B. Drosera Banksii.

ALABASTRA DIVERSA.—Part VI.

By Spencer Le M. Moore, F.L.S.

(Plates 409, 410.)

(Continued from p. 160.)

Dr. Rand's Rhodesian Acanthaceæ.

Thunbergia (§ Eu-Thunbergia) **Randii,** sp. n. Caule erecto? debili pubescente deinde puberulo, foliis subsessilibus late vel anguste oblongis obtusis basi breviter hastatis utrinque appresse piloso-pubescentibus, pedunculis foliis brevioribus pubescentibus, bracteolis ovato-lanceolatis acuminatis breviter ac crispe pubescentibus, corollæ bracteolas bene excedentis tubo angusto ipsis sub bracteolis leviter ampliato, antherarum loculis apice obtusis basi breviter calcaratis pubescentibus, stigmatis lobis subsimilibus deltoideo-rotundatis.

Hab. Buluwayo; Dec. 1897. Nos. 275, 276.

Caulis angulatus, 0·2 cm. diam. Foliorum lamina 3·5–6·0 cm. long., 0·7–1·5 cm. lat., leviter undulata, subtus egregie nervosa; petioli 0·2 cm. long., pubescentes. Pedunculi 1·5 cm. long. Bracteolæ 2·0 cm. long., obscure nervosæ. Calycis lobi setacei, hirsutuli. Corollæ vix 3·0 cm. long. tubus 0·6 cm. diam., ima basi usque ad 0.3 cm. coartatus; limbus vix 2·0 cm. diam. Antheræ 0·3 cm. long. Stigmatis lobi fere 0·3 cm. lat. Capsula 1·7 cm. long., pubescens. Semina compressa, 0·4 cm. diam.

To be inserted next to *T. Kirkiana* T. And., from which its oblong subsessile leaves, shortly pedunculate flowers, broader bracteoles, and smaller capsule serve at once to distinguish it.

Mr. Burkill kindly looked at the specimens of this and of the other species described later on in this paper, and indicated their proper positions in the genus.

T. lancifolia T. And. Salisbury, Sept. No. 631.

Hygrophila (§ Eu-Hygrophila) **rhodesiana,** sp. n. Planta humilis caulibus erectis ramosis e rhizomate crasso crebro emissis, ramulis quadrangulibus glabris, foliis congestis sessilibus linearibus omnibus albo-ciliatis, floribus in spicas breves terminales dispositis, nodis unifloris bifforisve, foliis floralibus reliquis similibus, calycis alte partiti lobis lineari-subulatis ciliatis lobo axiali reliquis longiore, corollæ tubo satis elongato sursum amplificato, staminibus vere didynamis basi ipsa per paria lateraliter coalitis, antheris staminum longiorum ceteras paullo excedentibus, capsula lineari basin versus angustata, 8-sperma.

Hab. Salisbury; July, 1898. No. 519.

Rhizoma 3·5 cm. diam. Folia modice circa 1·0 cm. long., 0·1–0·12 cm. lat., obtusa, nervus medianus subtus eminens. Bracteolæ foliis similes nisi breviores. Calycis lobus axialis 1·3 cm. lobi reliqui 1·0 cm. long. Corollæ tubus vix 1·0 cm. long., deorsum 0·13 sursum 0·3 cm. diam.; limbi lobi tubo æquilongi labii antici lobo mediano integro. Antheræ majores 0·2 cm. minores 0·16 cm. long., illarum filamentorum pars libera 0·4 cm.

harum 0·13 cm. long. Capsula vix 1·0 cm. long., 0·15 cm. lat. Semina 0·1 cm. long., dilute punicea.

To be compared with *H. senegalensis* T. And., a West African plant with which it has much superficial resemblance. The flowers are, however, different in the two cases, those of *H. rhodesiana* having a considerably longer tube and limb. Moreover, the unequally lobed calyx, emphatically didynamous stamens, and 8-seeded capsule are divergent points worthy of mention.

Ruellia patula Jacq. Buluwayo, early Jan. Nos. 177, 178.

Dyschoriste Fischeri Lindau. Buluwayo, Dec., early Jan. and May. Nos. 181, 182, 383.

Strobilanthopsis

Acanthacearum e tribu Ruelliearum genus novum (tab. 410A).

Calyx 5-partitus, segmentis linearibus, æqualibus vel leviter inæqualibus. Corollæ æstivatione contortæ tubus deorsum angustus, sursum eximie amplificatus et venoso-palatiferus; limbus obscure bilabiatus, labii inferioris lobo mediano lateralibus paullo majore. Stamina 4, didynama, juxta medium tubum affixa, vix exserta; filamenta per paria lateralia in membranam decurrentem coalita; antheræ omnes inter se æquales, oblongæ, dorsifixæ, 2-loculares, loculis æqualibus, parallelis, basi mucronatis. Pollinis grana ellipsoidea, costis longitudinalibus circa 8 induta (Rippenpollen); poræ 3, costales. Discus undulatus. Stylus inclusus, apice subulatus, lobo postico dentiformi. Ovula quove in loculo 2, quorum unum nonnunquam subobsoles. Capsula ovoidea-oblonga, basi angustata, aliquantulo compressa, 2-sperma, rarissime 1-sperma.—Suffrutex erectus crebro tenuiterque ramosus, glandulosus. Folia parva, membranacea, integerrima. Flores majusculi, ad apicem ramulorum brevium solitarii vel pauci.

S. hircina, sp. unica. Ramis ramulisque pubescentibus deinde glabris, foliis spathulatis vel lineari-spathulatis obtusis crebro glanduloso-ciliatis nec ultra 1·0 cm. long. (plerisque vero brevioribus) 0·2–0·25 cm. lat., calycis lobis obtusis dense glanduloso-pubescentibus 1·2–1·4 cm. long. 0·1– vix 0·2 cm. lat., corolla glabra in toto vix 3·0 cm. long., tubo dimidio inferiore 0·2 cm. dimidio superiore 0·8 cm. diam., limbo vix 2·0 cm. diam. hujus lobis obovatis emarginatis 0·7–0·8 cm. long., antheris obtusis 0·3 cm. long., ovario 0·35 cm. long., stylo vix 1·8 cm. long. puberulo, stigmatis lobo antico 0·1 cm. long., capsula glabra, 1·2–1·5 cm. long., seminibus sordide albidis 0·2 cm. lat.

Hab. Fort Gibbs, Rhodesia; Sept. 1898. No. 640.

After spending much time over this plant, I find myself compelled, although unwillingly, to propose a new genus for its reception. In many details of floral structure it is a *Dyschoriste;* but its calyx and capsule are plainly those of such Eu-Ruelliaceous genera as *Mellera* and *Mimulopsis*. There seems justification, therefore, for regarding the new genus as a link between the tribes *Eu-Ruellieæ* and *Strobilantheæ* as understood by Mr. C. B. Clarke. The African plant referred by the late Mr. Bentham to *Strobilanthes*

has now, together with some others since discovered, found a resting-place elsewhere: all these differ from the plant here described in having echinate pollen. The ribbed ellipsoidal pollen of *S. hircina* is a point in which it agrees with *Strobilanthes;* but, irrespective of the geographical difficulty, neither the method of insertion of the stamens nor the mucronate anthers are characters of that genus. Moreover, the absolute equality in size of all the anthers and the absence of a staminode, although not definite points as against *Strobilanthes*, suggest that the real affinity of *Strobilanthopsis* lies elsewhere. The position I venture to propose for it is next to *Dyschoriste*.

The reduced number of seeds as compared with ovules is rather curious. Some cells examined by me had a couple of ovules to all appearance fully developed: in other cases I found the lower ovule more or less rudimentary. No capsule that I examined had more than two seeds; and one, at least, had but a single seed.

Dr. Rand notes of this: "The plant has a rank disagreeable odour."

Blepharis Bainesii S. Moore. Buluwayo. May. No. 381.

B. diversispina Clarke. Near Shashi River, early Jan.; Buluwayo, May. Nos. 116, 380.

Crabbea cirsioides Nees. Buluwayo, May. No. 428.

Barleria (§ Prionitis) **Randii,** sp. n. Planta glabrata foliis ellipticis breviter spinoso-acuminatis basi in petiolum brevem cuneatim angustatis margine hyalinis membranaceo-coriaceis utrinque eminenter nervosis, foliis floralibus reliquis similibus nisi latioribus et paullo brevioribus, spinis interpetiolaribus foliis multo brevioribus rigidis complanatis, bracteis spinis subsimilibus, inflorescentia abbreviata pauciflora, sepalo postico oblongo-ovato spinoso-acuminato, sepalis anticis conjunctis postico subsimilibus nisi latioribus, corolla lutea bilabiata lobo antico oblongo quam lobi 4 postici multo breviore, staminum filamentis puberulis, capsula ?

Hab. Buluwayo; Dec. 1897. No. 115.

Caulis quadrangularis, 0·25 cm. diam. Foliorum lamina 3·0–4·0 cm. long., 1·5–2·5 cm. lat., in sicco lutescenti-viridis. Spinæ interpetiolares circa 1·0 cm. long., patentes, Sepalum posticum 0·9 cm. long., deorsum 0·35 cm. lat., obscure venosum, una cum sepalis anticis 0·4 cm. lat. margine breviter hyalinum; sepala lateralia reliquis similia nisi minora. Corollæ in toto vix 4·0 cm. long. tubum verum 1·5 cm. long., 0·25 cm. lat., deorsum usque ad 0·45 cm. dilatatum; limbi lobus anticus emarginatus, 1·2 cm. long. et 0·6 cm. lat.; lobi antici obovato-oblongi, integri, 1·5 cm. long. Staminodiorum antheræ reniformes, 0·1 cm. long., harum filamenta pubescentia. Ovarium oblongo-ovoideum, 0·3 cm. long. Stylus 2·7 cm. long. Ovulum secundum subobsoles.

A striking novelty quite unlike any species hitherto described.

Barleria Mackenii Hook. f. Buluwayo, Dec. No. 117.

Monechma bracteatum Hochst. No. 374 (not localized).

Justicia Betonica L. Buluwayo, May. No. 375.

J. flava Vahl. Buluwayo, Dec. No. 101.

Justicia (§ Rostellularia) **elegantula,** sp. n. Caule humili (e rhizomate incrassato oriundo?) laxe et albide araneoso mox piloso, foliis caulinis parvis lineari-oblanceolatis obtusis præsertim margine araneoso-pilosis membranaceis in sicco viridibus, spicis plurifloris basi interruptis, foliis floralibus reliquis similibus bracteas subulatas multo excedentibus, calycis segmentis anguste linearibus acuminatis corollæ tubum subæquantibus, corollæ extus pubescentis tubo a basi gradatim ampliato, limbi labio postico breviter 2-lobo, palato maxime eminente, ovario 4-ovulato.

Hab. Salisbury; Sept. 1898. No. 508.

Plantula tantum 6·0 cm. alt., foliis paucis minimis radicalibus deltoideo-rotundatis obtusissimis carnosulis 0·2–0·3 cm. long. et lat. (an propagulis?) instructa. Folia caulina circa 0·7 cm. long., raro 1·0 cm. attingentia. Folia floralia 0·8–1·0 cm. long., sursum 0·15–0·25 cm. lat. Bracteæ circa 0·2 cm. long., ciliatæ. Calycis segmenta 0·8 cm. long., crebro piloso-ciliata. Corolla 1·2 cm. long., læte purpurea; tubus sub limbo vix 0·4 cm. diam.; limbi labium posticum oblongum, labio antico paullo brevius; labii antici 0·8 cm. long. lobi ovati, intermedius lateralibus paullo major, lobi omnes margine crenulati. Antheræ 0·25 cm. long. Ovarium ovoideo-oblongum, 0·15 cm. long., glabrum; stylus glaber, 0·8 cm. long. Capsula —.

This plant should be inserted in the genus somewhere near *J. Kirkiana* T. And., from which, however, it differs in many respects—*e. g.* in its lowly habit, narrow calyx-lobes, &c., and the remarkable radical leaves. The specimens of this are three, and they bear the appearance of having been torn off a stout rootstock. This surmise is strengthened by the fact of another of Dr. Rand's specimens, which I consider a variety of *J. elegantula*, having such a rootstock.

Var. *elatior*. Planta robustior, usque ad 14·0 cm, alt., piloso-puberula nec araneosa; folia quam ea typi paullo majora; spicæ elongatæ. Folia radicalia desunt.

Hab. Salisbury; Sept. 1898. No. 642.

Var. *repens*. A plant gathered by Dr. Rand at Buluwayo in Dec. 1897 (No. 179) should also be referred here. The specimen shows the remains of a stoutish rootstock, the stem is repent and pubescent, and the leaves, up to 1 cm. long by 0·8 cm. broad, are more numerous, and, being mixed up with the short cymes, give the plant much the look of a member of § *Calophanoides*. There are no radical leaves.

J. protracta T. And. var. Salisbury, Sept. No. 509.

J. (§ Ansellia) **exigua,** sp. n. Caule tenui repente puberulo, foliis parvis ovatis vel ovato-oblongis obtusis vel obtusissimis in petiolum brevem desinentibus membranaceis mox glabris, spicis plurifloris folia excedentibus, foliis floralibus minimis subulatis, calycis segmentis lineari-lanceolatis corollæ tubo æquilongis, corolla miniata sc. vix 0·4 cm. long., disco parum conspicuo, ovulis quove in loculo 2.

Hab. Buluwayo; May, 1898. No. 389.

Folia 0·6–1·5 cm. long., 0·5 cm. lat., margine obscure undulata; petioli teneri, 0·2 cm. long. Spicæ modicæ 2·0 cm. long., tenues.

Folia floralia 0·1 cm. long. Calyx 0·4 cm long. Flores 0·25 cm. diam., extus fere omnino glabri, horum limbi lobi iis *J. uncinulatæ* Oliv. similes nisi minores. Antheræ 0·1 cm. long. Ovarium 0·06 cm. long., ovoideo-oblongum, una cum stylo 0·22 cm. long. puberulum.

Allied to *J. uncinulata* Oliv., but readily known by its slender habit, different leaves, and much smaller flowers.

Diapedium Melleri (*Dicliptera Melleri* Rolfe). Salisbury, Sept. No. 507*b*.

Peristrophe usta Clarke. Salisbury, Sept. No. 507.

Hypoëstes verticillaris R. Br. Buluwayo, May. No. 373.

Thunbergia (§ Eu-Thunbergia) **Delamerei,** sp. n. Verisimiliter repens caule sat gracili appresse hirtulo-pubescente, foliis pro genere minimis cordato-ovatis obtusis dentato-lobulatis pubescentibus petiolis brevibus anguste alatis pubescentibus fultis, pedunculis folia multo excedentibus pubescentibus, bracteolis abbreviatis inter se liberis oblongis obtusissimis pubescentibus, calycis pubescentis lobis lineari-subulatis, corollæ tubo sursum levissime amplificato lobis late obovato-rotundatis parum retusis, antherarum loculis deorsum villosulis superiorum loc. superiore calcarato inferiore mutico inferiorum loc. c. ambobus calcaratis, stigmatis bilabiati labiis infundibuliformibus superiore quam inferius paullo minore.

Hab. British East Africa, near Lake Marsabit, 1898; *Lord Delamere* (Herb. Mus. Brit.).

Folia 1·0-1·5 cm. long., basi usque 1·5 cm. diam., subtus eminenter nervosa, membranacea, in sicco viridia; petioli 0·4–0·7 cm. long., 0·15 cm lat. Pedunculi 2·5–3·0 cm. long. Bracteolæ 1·5 cm. long., 0·6–0·8 cm. lat., nervosa. Calycis lobi modici 0·3 cm. long. Corollæ tubus vix 2·5 cm. long., 0·6 cm. lat., purpureus; limbus circa 2·5 cm. diam., verisimiliter luteus. Antheræ 0·4 cm. long. Stigmatis labium superius 0·12 cm. diam. Capsula ?

Near *T. alata* Boj., but easily distinguished by its very small, shortly stalked, dentate-lobulate leaves, small obtuse bracteoles, cylindrical corolla-tube considerably exceeding the bracteoles in length, &c.

Blepharis tenuiramea, sp. n. Caule e basi ramoso, ramis erectis gracilibus crebro ramulosis strigose pubescentibus maturitate glabris, foliis sessilibus elongatis anguste linearibus apice spinuloso-acuminatis margine raro spinulosis paribus juxtapositis plerumque valde inæqualibus puberulis mox glabris, ramulis floriferis abbreviatis unifloris arcte congestis pluribus juxta solum oriundis adjectis paucis aliis caulinis, foliis floralibus lanceolato-oblongis margine necnon apice spinosis, bractea oblanceolata margine spinosa, bracteolis 0, corollæ labio antico 3-lobo, ovarii loculis 1-ovulatis, capsula 2-sperma.

Hab. Nyassaland, 1895; *Buchanan* (No. 387 in Herb. Mus. Brit.).

Planta circa 3·0–5·0 cm. alt. Ramuli 0·06–0·1 cm. diam., decolores. Folia 3·0–7·0 cm. long., 0·15–0·25 cm. lat., firma,

subtus conspicue nervosa. Ramulorum floriferorum fasciculi inferiores circa 3·0 cm. long., vix totidem lat., fasciculi caulini circa 2·5 cm. long. et lat. Folia floralia 1·5–2·5 cm. long. et 0·3–0·4 cm. lat., rigida, subtus eminenter 1-nervosa, utrinque transversim nervosa. Bractea vix 0·1 cm. long. Calycis lobi (lobis lateralibus exemptis) oblongi, anteriores 1·5 cm. long. posteriorem paullo superantes; lobi laterales lineari-lanceolati, fere 1·5 cm. long. Corolla in toto 1·5 cm. long.; tubus vix 0·6 cm. long., limbus sursum 0·7 cm. lat., hujus lobi ovati, obtusissimi, 0·3 cm. long. Antheræ 0·35 cm. long. Capsula ellipsoidea, vix 1·0 cm. long. Semina 0·6 cm. long. et 0·5 cm. lat.

The affinity of this seems to be with *B. Bainesii* S. Moore, but the different habit, broader leaves never spiny at the margin, differently shaped espinose floral leaves and bracts, &c., of the latter, make it easy to distinguish the two.

Barleria (§ Acanthoidea) **Delamerei**, sp. nov. Suffrutex caule pubescente hispidulo mox glabro, foliis parvis ovatis spinuloso-mucronatis basi cuneatis pubescentibus, racemis abbreviatis unilateralibus 1–3-floris, spinis interpetiolaribus binis sparsim ramosis foliis æquilongis vel iis longioribus plus minus complanatis pubescentibus, bracteis spinis interpetiolaribus similibus, sepalis majoribus oblongis valide spinoso-lobatis lateralia lanceolata longe excedentibus, floribus cæruleis, corollæ tubo sursum gradatim amplificato calycem fere duplo excedente limbo æqualiter 5-fido, ovulis perfectis quove in loculo 2.

Hab. British East Africa, near Lake Marsabit, 1898; *Lord Delamere* (Herb. Mus. Brit.).

Folia 0·7–1·3 cm. long., 0·4–0·5 cm. lat. Spinæ interpetiolares modicæ circa 1·0 cm. long. Racemi 2·0–2·5 cm. long. Sepalum posticum 2·0 cm. long., valide spinoso-acuminatum, hujus lamina sola 0·4 cm. lat. et spinæ ejusdem longitudinis; sepala antica 1·2 cm. long., horum lamina lat. et spinæ long. 0·3 cm., omnia eminenter nervosa; sepala lateralia 0·8 cm. long., ciliolata. Corolla 3·5 cm. long.; tubus basi 0·4 cm. medio 0·3 cm. sub limbo 0·7 cm. lat., puberulus. Stamina breviter exserta. Antheræ 0·2 cm. long. Staminodia duo vix 0·4 cm. long., tertium ad merum rudimentum lineari-subulatum 0·15 cm. long. reductum. Discus lobulatus. Ovarium ovoideum, glabrum, 0·3 cm. long. Stylus vix 3·0 cm. long., pilosulus. Capsula —.

A very distinct species, perhaps nearest *B. spinulosa* Klotzsch, but with too many characteristic features to render comparison necessary. But for its flowers, this might be taken for a *Blepharis*.

Leucas (§ Hemistoma) **Mackinderi**, sp. n. Erecta, ramosa, crebro foliosa, caule valido hirsuto, foliis ovatis vel ovato-oblongis obtusis grosse crenatis vel crenato-serratis deorsum in petiolum villosulum desinentibus hirsuto-pubescentibus juvenilibus subtus albo-tomentosis, verticillastris subdistantibus multifloris, bracteis externis lineari-lanceolatis internis anguste linearibus calycem subæquantibus hirsutis, calycis extus pubescentis ore obliquo dentibus 8 abbreviatis late deltoideis mucronatis, corollæ majusculæ tubo

glabro labio inferiore extus pubescente galea brunneo-villosa necnon margine longiuscule albo-ciliata.

Hab. Mount Kenia, 1899; *H. J. Mackinder* (Herb. Mus. Brit.).

Caulis vix 0·5 cm, diam., deinde pubescens. Foliorum lamina 4·0–7·0 cm. long. (rarissime 10·0 cm. attingens), 2·0–4·0 cm. lat., membranacea; petioli nunc usque 0·5 cm. abbreviati, nunc alati et usque 1·0–3·0 cm. prolongati. Verticillastri 2·5 cm. diam. Bracteæ externæ 1·3 cm. long., internæ 1·0 cm., illæ vix 0·2 cm. lat. Flores galea exempta albi. Calycis tubus vix 1·0 cm. long., deorsum usque 0·15 cm. angustatus, sursum 0·5 cm. lat.; hujus labium inferius 3-dentatum 0·6 cm. lat.; labium superius 5-dentatum et 0·5 cm. lat. Corollæ tubus 1·0 cm. long., 0·3 cm. diam., intus piloso-annulatus. Galea tubo æquilonga, emarginata. Labii inferioris lobus intermedius bifidus, 0·65 cm. lat.; lobi laterales ovati, obtusi, 0·3 cm. lat.

The affinity of this fine species seems to be with *L. Holstii* Gürke. The lanceolate outer bracts, the 8-toothed calyx, and certain other points of difference in floral structure should be noted.

Explanation of Plates 409 & 410 A.

(The drawings of the plants are natural size; of the figures more or less magnified, unless stated otherwise.)

Plate 409.—A. *Stephanolepis centauroides.* Fig. 1. An inner involucral scale. 2. A young floret showing the caducous pappus. 3. Mature floret. 4. Section of same, showing androecium and style-arms. 5. A stamen. 6. Ripe achene in side view and from above. 7. A hair of the pappus. B. *Phæocephalus gnidioides.* 8. A capitulum showing the densely hairy involucre and the bracteoles. 9. A floret. 10. Two of the anthers. 11. Style-arms. 12. Ripe achene. 13. A scale of the pappus.

Plate 410.—A. *Strobilanthopsis hircina.* Fig. 1. Corolla opened, showing androecium. 2. An anther. 3. A pollen-grain. 4. Ovary, &c. 5. Ovary opened. 6. Ripe capsule (nat. size). 7. Capsule opened, showing the seeds.

DROSERA BANKSII Br.

By James Britten, F.L.S.

(Plate 410 B.)

Among the plates of Australian plants prepared at the cost of Sir Joseph Banks, now in course of publication by the Trustees of the British Museum, are some which were not engraved. These will not, save in a few exceptional cases, be included in the Museum publication, which is confined to prints from the existing copper plates. Some of them are, however, of considerable interest; and the accompanying figure of *Drosera Banksii* is one of these.

So far as I am aware, this plant is still only known to science from the specimens collected at Endeavour's River by Banks: no other reference is given for it in the last edition of Mueller's *Census*, and no figure has hitherto been published. A brief diagnosis by Brown is given in DC. Prodr. i. 319, and the

plant had previously received a manuscript name from Solander but neither Brown's nor Solander's description is to be found in their respective manuscripts. Planchon (in Ann. Sci. Nat. 3rd Series, ix. 291) gives a full description, drawn up from the Banksian specimens, but did not consult the figure, as he says "flores mihi ignoti." On the back of his original sketch taken during the voyage, Sydney Parkinson has noted: "The petala white, anthera yellow, the leaves orange red, cilia yellow green, stalk and calyx tinged with red, the old capsules dark red purple." The drawing based on the original sketch, from which the figure now published is taken, is by James Miller.

NORFOLK NOTES.

By E. F. Linton, M.A.

The following list contains a selection from the notes made during a few years' residence in the county of Norfolk of the less common phanerogams and ferns. My observations were all subsequent to 1880; there are perhaps no plants in the list new for the county, any such discoveries having been published when fresh in the Transactions of the Norfolk and Norwich Natural History Society.

The Norwich Museum has in its possession an interesting herbarium collected by the late John Drew Salmon, 1835–37, chiefly from the neighbourhood of Thetford. I am not aware of any publication of its contents, and have inserted notes of infrequent plants from this source, which are duly acknowledged by the abbreviation, *hb. Salmon*.

The majority of the stations in the list are in Norfolk East (27). Those in West Norfolk are preceded by the comital number (28).

Norfolk is a county in which there is a tendency for the same territorial name to crop up two or three times over: there are two Roydons, two Ellinghams, a Caister and a Caistor, two Newtons, four Beestons, five Thorpes. I have referred in this paper to Roydon by Diss, Ellingham by Bungay, Caister by Yarmouth, and Thorpe St. Andrew, near Norwich—not to the other places of these ambiguous names. Newton (near Swaffham) is sufficiently distinct from Newton St. Faith's, on the Norwich and Cromer road; and Beeston St. Andrew, frequently mentioned, is a small unchurched parish three miles north-east of Norwich, not to be confused with Beeston by Cromer.

Thalictrum minus L. 28. Kilverstone Lane, near Thetford (1836), *hb. Salmon*.

T. flavum L. Roydon, near Diss. 28. Thetford (1835), *hb. Salmon*.

Ranunculus circinatus Sibth. Whittingham; Ranworth Broad Hoveton; Ellingham. 28. Larlingford.

R. fluitans Lam. 28. Plentiful in the Little Ouse, near Brandon.

R. trichophyllus Chaix. Ditch, Arminghall. 28. Larlingford.

R. heterophyllus Web. exp. (*R. radians* Hiern). Newton St. Faith's. —Var. *triphyllus* (Hiern). Thorpe by Norwich.

R. peltatus Schrank, var. *floribundus* (Bab.). Newton St. Faith's; near Whitehall Farm, Sprowston; Yarmouth.

R. sceleratus L. Yarmouth; Paston. 28. Thetford, *hb. Salmon*. Roudham, and a small form by the Ringmere; Larlingford.

R. Lingua L. Ranworth Broad; Ormesby. 28. Near Euston Bridge, Thetford, *hb. Salmon*.

R. sardous Crantz. Sporadic in clover-fields, Sprowston; Yarmouth.

Berberis vulgaris L. 28. Shadwell, near Thetford (1835), *hb. Salmon*. (In plenty near Elvedon Hall, Suffolk.)

Papaver Rhœas L. var. *strigosum* (Boenn.). Sprowston.

P. dubium L. var. *Lecoqii* (Lamotte). Crostwick.

P. Argemone L. Ellingham; Wymondham. 28. Castleacre; Swaffham.

P. hybridum L. Cromer to Runton.

Glaucium luteum L. Plentiful at Cley, 1887.

Chelidonium majus L. 28. Thetford (1835), *hb. Salmon;* Castleacre.

Cheiranthus Cheiri L. Castleacre Priory.

Nasturtium palustre DC. Hellesdon. 28. Roudham.

N. amphibium R. Br. 28. Larlingford (var. *variifolium* DC.).

Barbarea præcox R. Br. Casual at Sprowston, and Thorpe.

Arabis hirsuta Scop. 28. East Harling; Castleacre; Swaffham.

A. perfoliata Lam. Crostwick to Beeston. 1885; abundant and very fine in a shallow ditch, most of the plants too large for herbarium specimens. The next year there was only one plant, a poor one, though the ditch was undisturbed. The ways of some biennials are not easy to understand.

Cardamine amara L. Wet margin of Marsham Heath. 28. Holkham.

Alyssum calycinum L. Clover-field, Sprowston (1884).

Cochlearia officinalis L. 28. Near Denver sluice (1837), *hb. Salmon*.

C. Armoracia L. Frequent. Thorpe; by Barton Broad; Cromer; Mundesley; Tivetshall. 28. Swaffham.

Sisymbrium Thalianum J. Gay. Lane by Mousehold Heath; Cawston; North Walsham; Paston. 28. Harling Road.

S. Sophia L. North Walsham; Cromer; Cley. 28. Near Thetford; Castleacre.

Erysimum cheiranthoides L. Geldeston; Blickling; Swafield; Cley. 28. Thetford!, *hb. Salmon*, 1835. Larlingford.

Camelina sativa Crantz. Sprowston.

Brassica Sinapioides Roth. Cley. 28. Ditch near Harling Road Station.

Diplotaxis muralis DC. Between Old and New Catton; Tivetshall; Wymondham. 28. Wells.

Coronopus Ruellii All. Sprowston; Geldeston; Tivetshall. 28. Thetford, *hb. Salmon*. Larlingford.

Lepidium ruderale L. 28. South Lynn (1844), *hb. Salmon*.

L. campestre R. Br. Cromer; Crostwick, bank by the Rectory (where *L. hirtum* Sm. is reported by the Rev. K. Trimmer, which I did not see), and neighbouring field; Sprowston. 28. East Harling. *L. Smithii* occurred near North Walsham (1886), and at Witton (1888), both places given in Fl. Norfolk.

L. Draba L. Weybourne to Cley, *Rev. W. W. Mason*.

Thlaspi arvense L. Sprowston. 28. Thetford to Croxton (1836), *hb. Salmon*.

Teesdalia nudicaulis R. Br. Mousehold Heath, 1886. 28. Thetford to Rushford.

Reseda lutea L. Frequent. Ellingham; Attlebridge; Wymondham; Cawston; Worstead; Mundesley; Cromer; Cley. 28. Beetley to Gressenhall; Castleacre.

R. Luteola L. Cawston; Sprowston; Cley. 28. Thetford (1835), labelled *R. lutea, hb. Salmon*. Swaffham.

Helianthemum Chamæcistus Mill. Drymere Pit, near Swaffham. Apparently very scarce.

Viola silvestris Reich. Gawdy Hall Wood, Harleston.

V. ericetorum Schrader. Sprowston; plentiful on the North Dene, Yarmouth; but I never saw anything like *V. lactea* Sm. there (see Journ. Bot. Dec. 1881).

V. tricolor L. Sprowston. 28. Thetford, *hb. Salmon*. "Common" in Trimmer's Fl. Norf. must have included *V. arvensis* Murr., which does not occur in that work, but has been noticed by me at Sprowston; Cawston; Ellingham; Wymondham. 28. Beetley; Larlingford; Swaffham; and is probably generally distributed. *V. tricolor*, on the other hand, is scarce, if not rare.

Polygala serpyllacea Weihe. Newton St. Faith's; Cawston. It is not unlikely that some of Mr. Trimmer's localities are for this form.

Frankenia lævis L. "Yarmouth, Norfolk, Rev. G. R. Leathes," *hb. Salmon*. 28. Wells, 1884, &c.

Dianthus deltoides L. 28. Heath near Euston Bridge, Thetford, Norfolk, 1837, *hb. Salmon*.

Saponaria officinalis L. Hedgebank, Rackheath.

Silene anglica L. Cawston; Sprowston. 28. Swaffham.

S. noctiflora L. Newton St. Faith's, 1887; Sprowston, 1883; Alderford; Wymondham. 28. Scarning; Larling.

Lychnis Githago Scop. 28. Thetford, 1835, *hb. Salmon*. East Harling.

Cerastium semidecandrum L. Salhouse; Cromer.

C. arvense L. South Dene, Yarmouth; Cromer. 28. About Thetford; Holkham to Wells.

Stellaria aquatica Scop. Flordon. 28. Larlingford.

S. media Cyr. var. *Boræana* (Jord.). Wells to Holkham.

S. palustris Retz. Ranworth Broad. 28. Thetford, *hb. Salmon*. Larlingford; North Elmham.

S. uliginosa Murr. Beeston St. Andrew. 28. Larlingford.

Arenaria tenuifolia L. 28. Shadwell (near Thetford), *hb. Salmon*. Thetford; Castleacre Priory ruins. — Var. *hybrida* (Vill.). Just

south-east of Thetford, and on Croxton Heath, 1886; East Harling to Knettishall.

A. serpyllifolia L. var. *leptoclados* (Guss.). Ellingham; Wymondham; Sprowston. 28. Thetford; East Harling.

Sagina ciliata Fr. Swafield, 1886. 28. Croxton Heath; Roudham.

S. nodosa Fenzl. Alderford Common; South Repps Common. 28. Narford, near the Church; Swaffham.

Spergula arvensis L. Geldeston; Mousehold Heath. 28. Swaffham.

Spergularia marina Dum. Cley.

S. media Dum. Cley, 1887. 28. Wells, 1885.

Hypericum hircinum L. 28. Abundant in part of Holkham Park; introduced as cover for pheasants.

H. elodes L. Back of Grange House, Thorpe (by Norwich); Newton St. Faith's.

Tilia cordata Mill. Sprowston, opposite the entrance to the Hall; a fine old tree of some eight stems, four of which were blown down in a storm about 1885; Bradfield.

Geranium striatum L. Bradfield.

G. pyrenaicum L. 28. East Dereham.

G. pusillum L. Ellingham; Sprowston; Cromer. 28. Beetley; Swaffham; Lexham.

G. rotundifolium L. In plenty by the roadside north of Thetford Station.

G. columbinum L. Blickling. 28. Narborough to Narford.

G. lucidum L. Thorpe by Norwich; Knapton. 28. Thetford, 1837, *hb. Salmon.*

Euonymus europæus L. Arminghall Wood; Hellesdon; Sprowston; Geldeston; Wymondham. 28. Gressenhall to East Dereham; Southacre.

Rhamnus catharticus L. Hoveton Broad. 28. Thetford, 1835, *hb. Salmon.* Newton; Larlingford; Swaffham.

R. Frangula L. Hoveton Broad.

Genista anglica L. Newton St. Faith's; Cawston Heath.

Ulex Gallii Planch. Abundant on Mousehold Heath and at Newton St. Faith's; Cawston; Ormesby. 28. North Elmham; Beetley.

U. nanus Forster. Apparently this, on part of Cawston Heath.

Ononis repens L. Ormesby; Mundesley to Paston. 28. Thetford, *hb. Salmon.* Swaffham.

O. spinosa L. Attlebridge, near the Station (with some doubt; no specimens preserved). 28. Downham, 1837, *hb. Salmon.* East Harling to Knettishall.

Medicago sativa L. Sprowston.

M. falcata L. Norwich to Sprowston. 28. Thetford, 1836, *hb. Salmon.* Swaffham.

M. minima Desr. 28. Sandy pasture half-way between Thetford and Rushford.

Melilotus officinalis Lam. Sprowston.

Trifolium arvense L. Ellingham; Attlebridge; Trimingham. 28. Roudham; Lexham.

T. striatum L. Mousehold Heath; Yarmouth; Paston.

T. scabrum L. Yarmouth. 28. East Harling to Knettishall; Thetford.

T. fragiferum L. 28. Wells.

T. filiforme L. Sprowston; North Dene, Yarmouth; South Repps Common; Antingham.

Anthyllis Vulneraria L. Cromer. 28. Thetford!, 1835, *hb. Salmon.*

Lotus corniculatus L. var. *villosus* Ser. 28. South-east of Thetford.

Ornithopus perpusillus L. 28. Thetford, 1835, *hb. Salmon.* Roudham; Lexham.

Onobrychis viciæfolia Scop. 28. Thetford, *hb. Salmon.*

Vicia hirsuta Gray. Abundant on banks about Sprowston Lodge; North Walsham. 28. Swaffham.

V. gemella Crantz. Mundesley.

V. lathyroides L. 28. Thetford Abbey Heath, *hb. Salmon.* Thetford to Rushford; Croxton Heath.

Lathyrus palustris L. Frequent at Hoveton, and Ranworth ("Ranaugh" in Withering's *Arrangement* is the older and more correct name, agreeing with the local pronunciation). 28. "Against Euston Bridge, near Thetford, Norfolk, 1836," *hb. Salmon.*

Prunus Avium L. Arminghall.

P. Cerasus L. 28. Larlingford.

P. Padus L. In a roadside plantation, Drayton.

Spiræa Filipendula L. 28. Garboldisham to East Harling; Swaffham.

Rubus Idæus L. Though stated by Rev. K. Trimmer to be "not frequent," it would be more correct to describe the distribution as "frequent," dropping the negative. Mousehold Heath; Sprowston; Ormesby; Cawston. 28. Thetford, *hb. Salmon.* Beetley; Swaffham.

[Note.—In the fruticose section of this genus the nomenclature has itself altered considerably since most of these observations were made, and some of the plants here mentioned have been recorded elsewhere previously under another name. This list may therefore be taken to supersede any former publications of mine. The Rev. W. M. Rogers has given me much help in this genus.]

R. plicatus W. & N. Beeston St. Andrew; Sprowston. 28. Beetley towards Gressenhall, by the side of a lane.

R. Rogersii L. Roadside, in fair quantity near Westwick Woods, North Walsham.

R. affinis W. & N. Mousehould Heath and by the road leading thence to Salhouse; Ormesby, near the locality for *Carex trinervis*, very fine.

[*R. carpinifolius* W. & N., though recorded by Rev. K. Trimmer, I never saw in Norfolk, and suspect his plant was *R. carpinifolius* Blox., a usual mistake in his day.]

R. incurvatus Bab. From two spots, about half a mile apart, Sprowston Common and Boar Lane; named for me by Prof.

Babington, and confirmed by the Rev. W. M. Rogers as similar to his specimens from Berks.

R. Lindleianus Lees. Mousehold Heath. 28. Beetley; North Elmham; Gressenhall.

R. rhamnifolius W. & N., the usual English form. Cawston, at an entrance to the Heath; South Repps Common; Sprowston; Harleston.

R. pulcherrimus Neum. Very frequent. Redenhall; Thorpe; Mousehold Heath; Sprowston; Cawston; Cromer. 28. North Elmham.

R. villicaulis (sp. collect.) var. *Selmeri* (Lindeb.). Mousehold Heath, corner by the Salhouse Road; Sprowston Common; entrance to Cawston Heath from Cawston; Cromer to Runton.

R. gratus Focke. In fair quantity on Mousehold Heath; Sprowston Common.

R. rusticanus Merc. Extremely abundant and well distributed.

R. macrophyllus W. & N., aggreg. Thorpe; Sprowston; Beeston St. Andrew; Cawston to Aylsham. 28. North Elmham; Gressenhall; Swaffham.—Var. *Schlechtendalii* (Weihe). Beeston St. Andrew, in the Park hedge; Ormesby. — Var. *amplificatus* (Lees). Hedge opposite the chief entrance to Rackheath Park; Newton St. Faith's.

R. Sprengelii Weihe. Lane near Sprowston Church.

R. micans Gren. & Godr. Sprowston.

R. pyramidalis Kalt. Mousehold Heath; Sprowston, and between that and Thorpe; copse between Beeston and Rackheath.

R. leucostachys Schleich. Redenhall; Thorpe; Sprowston; Cawston; Blickling. 28. Beetley.

R. Boræanus Genev. Mousehold Heath, two or three bushes; south-west of North Walsham, plentiful in hedges; near Cromer (where I was directed to it by Mr. Charles Bailey), plentiful.

R. mucronatus Blox. Westwick Woods.

R. Gelertii Frider. Mousehold Heath; hedge by a copse, Beeston St. Andrew.—Var. *criniger* Linton. Boar Lane, Sprowston, and copse and hedge on the borders of Beeston St. Andrew. 28. Lexham Heath.

R. radula Weihe. Typical and plentiful on Mousehold Heath, and also some more strongly armed than usual; Sprowston Common, also in Boar Lane, and copses; Buckenham to Loddon; Thorpe by Norwich; Cawston.—Var. *echinatoides* Rogers. Mousehold Heath, "a weakly armed form," *W. M. R.*, scarce.

R. echinatus Lindl. Roadside, Mousehold Heath; Sprowston Common, and copse.

R. oigoclados Muell. & Lefv. Church Wood, Sprowston.

R. Babingtonii Bell-Salter. Gawdy Hall Wood, Redenhall.

R. fuscus W. & N. Westwick Woods, North Walsham.

R. pallidus W. & N. Very abundant and luxuriant in the Church Copse, Sprowston; seen nowhere else in the county.

R. Lintoni Focke. Boar Lane and Sprowston Common; also very fine in Church Wood. A hairy form of this distinct species has been found by the Rev. R. P. Murray and myself in Somerset, but, beyond this extension, no further localities are known.

R. rosaceus (sp. collect.) var. *hystrix* W. & N. Westwick, towards North Walsham.

R. Koehleri (sp. collect.) var. *cognatus* (N. E. Br.). Church Wood, Sprowston.

R. hirtus W. & K. var. *rotundifolius* Bab. In fair quantity in a copse just across the road from the north border of Mousehold Heath.

R. tereticaulis P. J. Muell. Luxuriant and abundant in Church Copse, Sprowston; less so on the northern border of Mousehold Heath; the two stations about two miles apart.

R. dumetorum W. & N. Beeston St. Andrew Park and Sprowston Common (var. *tuberculatus* Bab.); Mousehold Heath (var. *fasciculatus* P. J. Muell. *fide* Prof. Babington). Probably commoner than these notes imply.

R. corylifolius Sm. Frequent; usually a *sublustris* form in Norfolk East. Thorpe; Sprowston; Ellingham; Ormesby; Cawston. 28. North Elmham; Beetley; Larling.—Var. *cyclophyllus* Lindeb. Loddon to Buckenham and to Reedham; Harleston.

R. cæsius L. Ellingham; copse, Sprowston (var. *tenuis* Bell-Salter, *fide* Prof. Babington). 28. Gressenhall; East Harling; Larlingford (var. *intermedius* Bab., confirmed by the Professor).

Geum rivale L. 28. Thetford, 1835, *hb. Salmon.*

Potentilla argentea L. Ellingham; Sprowston; Swafield; Mundesley to Paston. 28. Thetford, 1835, *hb. Salmon.* Gressenhall to Beetley.

P. palustris Scop. Ranworth; Barton Broad. 28. Lexham.

Alchemilla vulgaris L. The only Norfolk specimen I remember to have seen came from Hardingham, 1834, *hb. J. A. Power*, communicated by Mr. E. S. Salmon; it proved on examination to be the segregate or subspecies *A. alpestris* Schmidt.

Poterium Sanguisorba L. 28. Swaffham.

P. officinale Hook. fil. 28. Wretton.

Rosa tomentosa Sm. Ellingham; Beeston St. Andrew; Flordon; Bradfield. 28. Swaffham.—Var. *scabriuscula* (Sm.). Rackheath; Ellingham.

R. rubiginosa L. Sprowston. 28. Beetley; Newton. — Var. *comosa* Rip. Road from Mousehold to Salhouse; Loddon; Kirby Cane. 28. Swaffham.

R. micrantha Sm. Rackheath; Sprowston; Frettenham; Loddon.

R. obtusifolia Desv. Horsford; Sprowston. 28. Larlingford; Swaffham. — Var. *frondosa* Baker. Flordon; Loddon; Hellesdon to Earlham; Salhouse Road, near Mousehold Heath; Haynford; Alderford; Bradfield; Frettenham. — Var. *tomentella* (Leman). Wymondham; Stubb's Green, Loddon; Flordon; Frettenham. 28. Common about Scarning; Beetley.

R. canina L. var. *lutetiana* (Leman). Frequent, *e.g.* Sprowston; Thorpe; Ormesby; Flordon; Ellingham. 28. East Harling; Beetley; North Elmham; Swaffham; Castleacre.— Var. *surculosa* (Woods). Loddon; Frettenham.—Var. *sphærica* (Gren.). Cawston; Ellingham to Geldeston. 28. North Elmham; Beetley to Gressenhall; Castleacre. — Var. *senticosa* (Ach.). Near Stubb's Green, Loddon.— Var. *dumalis* (Bechst.). Loddon; Haynford; Fretten-

ham. 28. Larling; Beetley to Gressenhall; Swaffham; Newton. —Var. *verticillacantha* (Mérat). Beeston St. Andrew; Sprowston; Frettenham. 28. Lexham Heath. — Var. *Blondæana* (Rip.). Sprowston; Beeston St. Andrew. — Var. *urbica* (Leman). Old Catton; Thorpe; Loddon; Postwick; Haynford; Flordon; Ellingham, &c. 28. Denver, 1837, *hb. Salmon*. Scarning; Beetley: Larling. — Var. *dumetorum* (Thuill.). Rackheath; Trunch. 28. Castleacre. — Var. *arvatica* Baker. Crostwick; Sprowston, a form with sepals more or less ascending; Flordon; Wymondham. 28. Beetley to Gressenhall; Castleacre; Swaffham.— Var. *Borreri* (Woods). Near Sprowston Church; Ormesby.

R. coriifolia Fries. Hedge in the School Lane, Sprowston, and also by a copse about a mile to the east.

R. arvensis L. Loddon; Haynford to Spixworth. 28. Newton; Swaffham.

Pyrus communis L. Hedges, Sprowston towards Thorpe; reported to have been grafted by a gardener. 28. Snare Hill, near Thetford, 1836, *hb. Salmon*.

P. Malus L. var. *acerba* DC. Flordon. 28. Roudham; Thetford to Rushford; Lexham. — Var. *mitis* Wallr. Knapton; Postwick; Sprowston. 28. Thetford to Rushford; Swaffham.

(To be continued.)

THE EUROPEAN SPHAGNACEÆ

(AFTER WARNSTORF)

BY E. CHARLES HORRELL, F.L.S.

(Continued from p. 167.)

4. S. WARNSTORFII Russ. in Sitzungsb. der Dorpater Naturf.-Ges. 1887, 315.

Syn. *S. acutifolium* var. *gracile* Russ. Beitr. 1865, 44.

Tufts generally loose, in wider spread or smaller patches; uniformly light or dark green, yellowish-white, reddish, violet to dark purple-red, or frequently variegated with a mixture of green and red or of yellowish-white and red. Plants generally delicate and slender, rigid and erect, rarely flaccid; varying much in habit; generally brachy-, eury-, or homalocladous, more rarely anocladous, never orthocladous, not rarely dasy-, drepano-, or katocladous, rarely squarrose. Stems upright, thin, 3–15 cm. in length.

Wood-cylinder strongly developed, formed of strongly thickened cells, generally reddish or violet to dark red, more rarely colourless or greenish.

Stem-cortex in 2–4 very rarely 5 layers, the inner cells relatively with very thick strongly pitted walls; the outer cells without or very rarely with a few scattered pores.

Stem-leaves small to medium size, ·4 to ·5 mm. long, generally lingulate, from the base very gradually narrowed, then somewhat

suddenly narrowed to the rounded or toothed apex; border narrow and much widened below as in *S. acutifolium*. Hyaline cells in the upper half of the leaf, rhomboid to elongate-rhomboid, generally septate, sometimes into 3–4 daughter-cells; non-fibrillose or not rarely with a few very delicate fibrils, in the first case with longitudinal plicæ.

Fascicles composed of 3–5 branches, 2–3 of which are spreading. *Branch-leaves* of the basal half of the spreading branches ovate, and, owing to the inrolling of the margins, produced into a subulate, 3–5-toothed, truncate apex; the leaves are frequently very regularly arranged in five rows, at times are somewhat secund, and always have the apices spreading; the leaves of the pendent branches, as well as those of the apical half of the spreading branches, are narrow-ovate to lanceolate; at the base of the pendent branches they are broad-ovate. Hyaline cells of leaves from the basal half of the spreading branches have on the outer surface numerous pores; these are in the lower half of the leaf large, oval, and few in number; in the subulate upper half they are remarkably small, almost circular and very numerous, and are surrounded by a relatively broad, strongly thickened ring. In the leaves of the apical half of the spreading branches, and in all the leaves of the pendent branches, the pores decrease gradually in size from the base to the apex; the small pores at the apex being, however, much larger than the remarkably small ones in the first described leaves. Pores on the inner surface of all the leaves more numerous in the basal part and near the lateral margins, large, generally non-ringed, and frequently corresponding in position with the pores on the outer surface, so that complete perforation of the leaf results.

Chlorophyllose cells in section trapezoid, more rarely triangular, and inserted between the hyaline cells on the inner surface of the leaf. Hyaline cells more strongly convex on the outer surface of the leaf.

Dioicous; male branches clavate towards the apex, the apex itself being elongate-subulate, light to dark red. Perigonial bracts ovate, broader and shorter than the leaves of the sterile branches; hyaline cells in the basal half non-fibrillose and without pores, only rarely with scattered, very delicate rudimentary fibrils; in the upper half with very small narrowly ringed pores. Female flowers unknown.

Leaves of the fruiting branches large, ovate-lanceolate, in the basal half composed of chlorophyllose cells only, in the upper half of both kinds of cells, of which the hyaline are always non-fibrillose, and generally 1–3 times septate. Capsule relatively large, dark red-brown; spores dark yellow, finely papillose. Fruit very rare.

This small, delicate, and very pretty *Sphagnum* is easily distinguished from its nearest ally, *S. rubellum* (1) by the remarkably minute strongly ringed pores on the outer surface of the apical half of the leaves of the spreading branches; these pores are smaller than those of any other European species, and are especially conspicuous owing to their being suddenly and not gradually replaced

by the larger pores of the basal half of the leaf. In *S. Wulfianum* the upper pores are also very small, sometimes scarcely larger than in this species, but in that case they become gradually and uniformly larger from the apex to the base; (2) by the stem-leaves, which resemble those of *S. rubellum* in size and shape, but differ in the less frequent division of the hyaline cells, and in the absence of fibrils, or, if these are present, by their greater delicacy; and (3) by the habitat.

Hab. *S. Warnstorfii* prefers wet birch-swamps, or the wet meadows on the borders of moors. It is never found on elevated moorlands, nor in company with *S. rubellum*, but frequently grows, on the contrary, with *S. teres*.

The number of known forms of this moss is much greater than in *S. rubellum* or *S. fuscum*, and the varieties are based primarily according to the colour of the tufts.

Distrib. Russia, Finland, Sweden, Denmark, Germany, Switzerland, France, North America.

Var. *flavescens* Warnst. in Samml. Europ. Torfm. No. 239 (1892). Colour yellowish throughout.

Var. *pallescens* Warnst. in Samml. Europ. Torfm. No. 240 (1892). Colour pale whitish green throughout.

Var. *purpurascens* Russ. apud Warnst. in Bot. Gaz. xv. p. 140. Plants of a beautiful rose, purple, or violet-red colour in the upper part, paler below, but with no admixture of green.

Ben Lawers, Perth (*Ewing*).

Var. *versicolor* Russ. apud Warnst. in Bot. Gaz. xv. p. 140. Plants coloured with a mixture of red and green; capitulum generally pale-, rose-, purple- or violet-red, the middle part of the plant greenish, the lower part bleached.

Widdy Bank Fell, Teesdale, Durham (*Horrell*).

Var. *viride* Russ. apud Warnst. in Bot. Gaz. xv. p. 140. Colour green or greenish throughout, with only here and there a delicate flush of pale red; the lower part bleached.

Var. *flavo-glaucescens* Warnst. in Schrift. der Naturf. Ges. in Danzig N. F. Bd. ix. Heft 2, 1896, p. 154. Capitulum of a dirty yellowish, or at times greenish colour, bleached below.

Var. *virescens* Russ. apud Warnst. in Schrift. der Naturf. Ges. in Danzig N. F. Bd. ix. Heft 2, 1896, p. 154. Plants green throughout, or slightly bleached below.

5. S. RUBELLUM Wils. Bryol. Brit. 1855, 19.

Syn. *S. acutifolium* var. *tenellum* Schimp. Hist. Nat. des Sph. 1858, 64. *S. acutifolium* var. *rubellum* Russ. Beitr. 1865, 41. *S. tenellum* Klinggr. in Schrift. d. phys.-ök. Ges. Königsberg, 1872, 4.

Exs. Braithw. Sphagn. Brit. Exs. Nos. 36, 37.

Tufts soft, looser, and taller, or denser and shorter. Colour very various: pale, yellowish, green, rose-red, or violet. Plants generally very delicate and soft, resembling in size *S. Warnstorfii* or *S. fuscum*.

Wood-cylinder pale or reddish; pith-cells thick-walled.

Stem-leaves larger or smaller, lingulate, not seldom, in consequence of the incurving of the margin, cucullate at the apex,

which is frequently torn, toothed, or weakly fimbriate; the broad border is much widened below; lateral margins slightly undulate; hyaline cells with or without fibrils in the upper half of the leaf, 2–4 (rarely to 6) times septate by oblique cross-walls, and with delicate longitudinal plicæ.

Stem-cortex in 3–4 layers, formed of medium-sized, thin-walled cells, of which the outer walls are not porose.

Fascicles distant or closer together, of 3–4 branches, of which the two stronger are sometimes longer, sometimes shorter. The direction of the branches with regard to the stem various. Retort-cells of the branch-cortex with distinctly recurved neck, having a pore at the apex. *Branch-leaves* loosely or closely imbricate, frequently secund, ovate to ovate-lanceolate, small; toothed on the broad rounded apex, margin inrolled above; border consisting of 2–3 rows of narrow cells; the leaf has a longitudinal fold in the middle above the base, and the membranes of the hyaline cells have numerous plicæ. Inner surface with numerous smaller pores in the upper half, especially in the upper and lower cell angles, and larger ones in the wider part of the leaf, and especially near the margins; the entire outer surface with pores, which at the apex are strongly ringed, and but little smaller than those in the middle of the leaf; at the base the pores are very large, non-ringed, placed singly in the middle of the cell-wall between the fibrils; near the margins the pores on the upper and lower surfaces frequently exactly cover one another, so that complete perforation of the leaf results.

Chlorophyllose cells in section as in *S. fuscum*.

Dioicous, rarely monoicous; male branches in the antheridium-bearing part always purple- or violet-red; perigonial bracts ovate, produced above into a smaller, rounded, slightly toothed, cucullate apex; in the lower part without fibrils and pores. Perichætial bracts large, ovate, suddenly produced above into a narrow truncate involute apex; in the lower part consisting of either chlorophyllose cells only, or, with the exception of the apex, with both kinds of cells throughout the leaf; hyaline cells several times divided by oblique or longitudinal or transverse walls; without fibrils or pores; at the apex itself composed only of short, narrow, thick-walled, and pitted chlorophyllose cells. Leaf-border wide. Spores ochre, large. Fruit very rare.

Hab. *S. rubellum*, like *S. fuscum*, with which it frequently grows intermixed in the same tuft, is a true moorland plant.

Distrib. Common throughout Europe and North America. Brookwood, Surrey (*Sherrin*); Burnham Common, Bucks (*Sherrin*); Wybunbury Bog, Cheshire (*Wilson*); Tremethick Moor, Penzance, Cornwall (*Curnow*); Fowlshaw Moss, Westmoreland (*Stabler*); Leckby Carr, Yorkshire (*Ingham*); Holt, East Norfolk (*Burrell*); Widdy Bank Fell, Teesdale, Durham (*Horrell*); Whixall Moss, Shropshire (*Ley*); Keston Common, Kent (*Horrell*); Tilgate Forest, Sussex (*Horrell*); Islay (*Gilmour*); Cennant Llenyrch, Merioneth (*D. A. Jones*).

The numerous varieties are based upon the colour of the tufts.

Var. *flavum* C. Jens. apud Warnst. in Bot. Ver. der Prov. Brandenburg, xxx. p. 106 (sub *S. tenello*). Plants yellow throughout.

Penzance, Cornwall (*Ley*); Borth bog, Cardigan (*Ley*); Maentwrog, Merioneth (*Horrell*).

Var. *pallescens* Warnst. in Bot. Gaz. xv. p. 137 (sub *S. tenello*). Plants whitish, or pale yellowish green above, in the middle sometimes pale brownish or very faint red; male branches a dull violet.

Widdy Bank Fell, Teesdale, Durham (*Horrell*).

Var. *pallido-glaucescens* Warnst. in Schrift. der Naturf. Ges. in Danzig N. F. Bd. ix. Heft 2, 1896, p. 154 (sub *S. tenello*). Capitulum pale yellowish to whitish, sometimes pale green; bleached below.

Var. *purpurascens* Warnst. in Samml. Europ. Torfm. No. 64 (sub *S. tenello*). Colour for the most part a dirty purple-red.

Var. *rubrum* Grav. apud Warnst. *l. c.* No. 62 (sub *S. tenello*). Colour a mixture of dark purple-violet and green in the upper part; pale or dirty red below.

Newby Bridge, North Lancashire (*Paul*).

Var. *versicolor* Russ. apud Warnst. in Schrift. der Naturf. Ges. in Danzig N. F. Bd. ix. Heft. 2, 1896, p. 154 (sub *S. tenello*). Tufts a dirty pale red colour, with some yellow intermixed.

Ulpha Moss, Westmoreland (*West*); Brookwood, Surrey (*Sherrin*); Islay (*Gilmour*); Widdy Bank Fell, Teesdale, Durham (*Horrell*).

Var. *violaceum* Warnst. in Bot. Ver. der Prov. Brandenburg, xxx. p. 106 (sub *S. tenello*). Colour violet throughout.

Var. *viride* Warnst. *l. c.* (sub *S. tenello*). Tufts greyish or vivid green throughout, with scarcely any admixture of red; male branches violet-red.

Burnham Common, Bucks (*Sherrin*).

6. S. FUSCUM Klinggr. in Beschr. d. i. Preussen gef. Art. u. Varr. d. Gatt. Sphagnum (Schrift. d. phys.-ök. Ges. i. Königsb. 1872, 4).

Syn. *S. acutifolium* var. *fuscum* Schimp. Entw.-gesch. d. Torfm. 1858, 57.

Exsicc. Braithw. Sphagn. Brit. Exs. No. 39.

Tufts denser or looser, widely extended or more frequently cushion-like. Colour usually a characteristic grey-green intermixed with brown or reddish-brown, more rarely whitish or green. Stems according to the habitat, taller or shorter, usually thin and delicate, as in *S. rubellum* and *S. Warnstorfii*.

Wood-cylinder always red-brown, with strongly thickened central cells.

Stem-cortex irregularly 3–4-, rarely 5-layered, formed of medium-sized, thin-walled cells; superficial cells without pores; inner cells with small pores.

Stem-leaves usually small, lingulate, the rounded apex frequently suddenly contracted into a small cucullate point, which is usually somewhat fimbriate; the broad border greatly widened below. Hyaline cells almost always without fibrils and pores, very rarely with rudimentary fibrils below the apex, 2–4 times septate by oblique cross-walls, and with delicate longitudinal plicæ in the cell-membrane; basal cells swollen and enlarged.

Fascicles of 3–4 branches, of which the stronger ones are sometimes long and very thin at the extremity, sometimes shorter and more shortly acuminate. Branches distant or closer together; sometimes very densely arranged; either drepanocladous, anocladous, or orthocladous. *Branch-leaves* small, when dry almost without metallic lustre, closely or loosely imbricate, from an ovate base produced into a comparatively short, rounded-truncate, toothed apex; margin at apex inrolled; border of 3–4 rows of narrow cells; the leaf has a longitudinal fold in the middle above the base. Hyaline cells on the inner surface of the leaf in the upper part with numerous usually non-ringed pores; these are chiefly in the upper and lower cell-angles; near the margins of the leaf, and immediately above the base, the pores are in the middle of the cell-walls, between the fibrils; on the outer surface with numerous pores on all parts of the leaf; these are small and strongly ringed at the apex, becoming gradually larger and less strongly ringed towards the base, where they are very large, non-ringed, and situated in the middle of the cell-wall between the fibrils, the upper pores being on the commissures. In the neighbourhood of the leaf-margins the outer and inner pores frequently exactly cover one another, so that complete perforation of the leaf ensues.

Chlorophyllose cells in section triangular to isosceles-trapezoid, inserted between the hyaline cells on the inner surface, and here always free; on the outer surface sometimes enclosed, sometimes free; hyaline cells more strongly convex on the outer surface.

Dioicous; male branches quite similar to the sterile ones, in the antheridium-bearing part little or not at all thickened, here always yellow-brown, later becoming elongated at the apex; perigonal bracts very small, from the lower sterile leaves of the male branch clearly distinguishable, broadly oval, toothed on the rounded apex; pore-formation as in the other branch-leaves; in the lower half or two-thirds without fibrils and pores, more rarely without fibrils and pores on the whole surface.

Fruiting branches generally short; perichætial bracts large, ovate, with broad border; in the lower part with elongated rectangular pitted chlorophyllose cells; above with both kinds of cells, of which the hyaline ones are 1–4 times septate by oblique cross-walls; in the apex itself with narrow short chlorophyllose cells; spores golden-yellow, papillose or almost smooth, 25–30 μ in diameter.

Hab. *S. fuscum* is a true moorland plant, where it may usually be easily recognized by the dense and tall tufts with the very characteristic colouring. The only known Sphagna having a similar reddish-brown colour are *S. imbricatum* var. *fuscum* Warnst. and *S. submitens* var. *flavicomans* Card. In the rare cases where *S. fuscum* is greenish in colour, it can easily be mistaken for *S. rubellum* or *S. Warnstorfii*, but from each of these it may be known by the wood-cylinder, which is always reddish-brown.

Distrib. Common throughout Europe and North America. Witherslack Moss, Westmoreland (*Barnes*); Widdy Bank Fell, Teesdale, Durham (*Horrell*); Jura (*Ewing*).

The varieties are based in the first place on the colour of the tufts; and the forms on the length, direction, and position of the branches.

Var. *fuscescens* Warnst. in Bot. Ver. der Prov. Brand. xxx. 1888, 103. Tufts brown throughout, almost entirely without any admixture of green, the capitulum sometimes reddish brown.

Var. *fusco-viride* Warnst. in Bot. Gaz. 1890, 135. Colour of the tufts greenish in the upper part, brownish below; sometimes the brown predominating, sometimes the green.

Var. *pallescens* Russ. apud Warnst. in Schrift. der Naturf.-ges. in Danzig, N. F. Bd. ix. Ht. 2, 1897, 154. Colour a pale brown, mixed at times with more or less green.

Var. *virescens* Russ. apud Warnst. *l. c.* Colour in the upper part greyish-green, below pale brownish or whitish.

7. S. ACUTIFOLIUM Russ. & Warnst. apud Warnst. in Bot. Ver. der Prov. Brand. xxx. 1888, 112.

Syn. *S. acutifolium* Ehrh. Pl. Crypt. Exsicc. No. 72, ex parte. Exsicc. Braithw. Sphagn. Exsicc. Brit. Nos. 34, 35.

Plants in respect to colour and habit exceedingly variable.

Tufts looser, or denser, taller or shorter, pale green or yellow-green, pale red, rose- or purple-red, or variegated in colour. Stems sometimes slender and delicate, sometimes as strong and robust as *S. Russowii*.

Wood-cylinder pale or yellowish-green, very frequently red, but never brown.

Stem-cortex 3–4-layered, composed of thin-walled cells of medium size. The outer walls without pores, the inner with small pores.

Stem-leaves smaller or larger, narrower or broader (up to 3½ times as long as the width at the base); from the base more or less distinctly narrowed above, generally with slightly undulate margin, isosceles-triangular to triangular-lingulate, with the apex truncate and toothed; margin somewhat inrolled above; the apex but little or not at all elongated; border wider or narrower, and in normally developed plants always much widened towards the base; hyaline cells in the apical half of the leaf, rhomboid, generally only divided by a single cross-wall into two daughter-cells, and on the same stem sometimes with fibrils and pores, sometimes without either.

Fascicles with two stronger spreading branches and one or two thinner pendent branches, which are sometimes closely appressed to the stem, sometimes less so, according to the damper or drier character of the habitat. Branches longer or shorter, and varying much in their direction; leaves always arranged all round the branch. *Branch-leaves* longly ovate to ovate-lanceolate; apex generally rounded-truncate and toothed; margin above inrolled; border very narrow; generally closely imbricate, more rarely erecto-patent, never distinctly in five rows, never secund or squarrose; when dry without metallic lustre; in the middle of the leaf near the base with a longitudinal fold; membranes of the hyaline cells with delicate plicæ. Pores on the inner surface of the leaf in the upper part almost exclusively in the upper and lower cell-angles, small and strongly ringed; in the middle and

basal part numerous near the commissures, large, round, and weakly ringed or non-bordered. Pores on the outer surface of the leaf large and very numerous along the commissures. They become gradually larger and less strongly bordered from the apex downwards; the pores near the base and near the lateral margins are almost or quite without border, and are situated in the middle of the cell-wall between the fibrils.

Chlorophyllose cells in section triangular to trapezoid; inserted between the only slightly convex hyaline cells on the inner surface of the leaf and here always free; on the outer surface either enclosed or partly free.

Monoicous, more rarely dioicous; male branches in the antheridium-bearing part clavate and red, later with the apex elongated and thin; bracts wider and shorter than the leaves of the sterile branches, generally suddenly produced into a short, truncate and toothed apex, in the lower half either entirely without fibrils and pores or with delicate rudimentary fibrils. Leaves of the fruiting branches large, ovate, usually composed in the lower part of elongated rectangular and pitted chlorophyllose cells only; at and above the middle of the leaf, of both kinds of cells; and at the truncate apex generally formed only of very short, narrowly rhomboid chlorophyllose cells; hyaline cells generally several times divided, but almost always without fibrils and pores; border wide; spores yellow, papillose, 25–30 μ in diameter. Fruit common.

Hab. The commonest and most widely distributed of all the European Sphagna, being found both in the lowlands, on moors, and in high mountain regions. In Britain it would, however, appear to be less common than some other species of the *Acutifolia* section—e. g. *S. subnitens* and *S. rubellum*.

S. acutifolium is distinguished from its allies by (1) the form of the stem-leaves; (2) the absence of pores in the superficial layer of the stem-cortex, which are frequently present in *S. subnitens*, and always present in *S. quinquefarium* and *S. Russowii*; (3) by the branch-leaves when dry being always without metallic lustre, and almost always closely imbricate, never secund, squarrose or distinctly 5-ranked.

The very numerous varieties depend upon the colour of the tufts, and the forms upon the greater or less degree of robustness of the plants, and the length and direction of the branches.

Distrib. Europe, Asia, Africa, North and South America.

Var. *chlorinum* Warnst. in Europ. Torfm. No. 75, 1888. Plants yellowish or pale greenish above, the capitulum rarely more or less reddish.

Var. *flavescens* Warnst. in Bot. Ver. der Prov. Brandenburg, xxx. 1888, 114. Plants yellowish throughout.

Var. *flavo-glaucescens* Warnst. in Schrift. der Naturf. Ges. in Danzig, N. F. Bd. ix. Ht. 2, 1897, 153. Plants having the capitulum yellow or at times grey-green, paler below.

Var. *flavo-rubellum* Warnst. in Bot. Gaz. xv. 1890, 193. Plants faint reddish mixed with pale yellow.

Var. *fusco-glaucescens* Warnst. in Schrift. der Naturf. Ges. in Danzig, N. F. Bd. ix. Ht. 2, 1897, 154. Plants having the capitulum brownish, bleached below.

Var. *fusco-virescens* Warnst. in Europ. Torfm. 1881, 49. Dark green above, grey-brownish below.

Var. *griseum* Warnst. in Bot. Ver. der Prov. Brandenburg, xxx. 1888, 114. Plants greyish-green throughout.

Var. *obscurum* Warnst. *l. c.* Plants of an indefinite dull colour.

Var. *pallescens* Warnst. *l. c.* The entire plant whitish, or in the capitulum slightly tinged with pale greenish, reddish or yellowish; dark green entirely absent.

Jura (*Ewing*); Montgomery (*Ley*); Burnham Common, Bucks (*Sherrin*).

Var. *pallido-glaucescens* Warnst. in Schrift. der Naturf. Ges. in Danzig, N.F. Bd. ix. Ht. 2, 1897, 154. Plants having the capitulum whitish throughout, bleached below.

Var. *purpurascens* Warnst. in Hedwigia, 1888, 274. Plants in the upper part, and especially in the capitulum, of a beautiful rose to purple-red colour; paler below, but without admixture of green.

Var. *roseum* Warnst. in Bot. Ver. der Prov. Brand. xli. 1899, 37. Plants having the capitulum rose-red; paler red below.

Widdy Bank Fell, Teesdale, Durham (*Horrell*).

Var. *rubrum* Warnst. in Bot. Ver. der Prov. Brandenburg, xxx. 1888, 114. Plants red throughout.

Var. *versicolor* Warnst. in Bot. Ver. der Prov. Brandenburg, xxx. 114. Plants of various shades of green and red mingled together; generally more or less red in the capitulum, green below.

Widdy Bank Fell, Teesdale, Durham (*Horrell*); Tilgate Forest, Sussex (*Horrell*); Islay (*Ley*).

Var. *viride* Warnst. in Bot. Ver. der Prov. Brandenburg, xxx. 114 (syn. var. *virescens* Warnst. Europ. Torfm. No. 73). Plants above light or dark green or greyish-green, generally bleached below.

Brookwood, Surrey (*Sherrin*); Keston Common, Kent (*Horrell*); Tilgate Forest, Sussex (*Horrell*); Cennant Llenyrch, Merioneth (*D. A. Jones*); Maentwrog, Merioneth (*Horrell*); Islay (*Ley*).

8. S. TENERUM Warnst. Beitr. zur Kenntn. Exot. Sph. in Hedwigia, 1890, 194.

Syn. *S. acutifolium* var. *tenerum* Aust. in herb.

More robust than the most robust forms of *S. acutifolium*.

Stem-cortex of 2–3 layers; cells thin-walled and wide, at times the outer wall porose, the inner walls with small pores.

Wood-cylinder pale vinous-red.

Stem-leaves large, isosceles-triangular; margin generally undulate and inrolled above; produced into a rather long truncate and toothed apex; border narrow almost to the base and then suddenly distinctly widened. Hyaline cells generally divided by oblique cross-walls; fibrils numerous to the base; on the inner surface with large round pores, on the outer with semi-elliptical pores in rows on the commissures.

Fascicles generally with four branches; all the branches long and comparatively thick, the pendent branches being but little

weaker than the spreading ones. *Branch-leaves* rather large, ovate-lanceolate, regularly imbricate, apex truncate and toothed with the margin inrolled; when dry almost without metallic lustre. Hyaline cells on the inner surface towards the lateral margins of the leaf with large round pores; near the apex with small pores in the upper and lower cell-angles; pores on the outer surface, semi-elliptical in rows at the commissures.

Chlorophyllose cells in section isosceles-triangular, inserted between the but little convex hyaline cells on the inner surface of the leaf and here free; on the outer surface generally completely enclosed by the much swollen hyaline cells.

Distrib. France; North America.

(To be continued.)

BIBLIOGRAPHICAL NOTES.

XXIII.—An Overlooked Paper by Rafinesque.

[So much interest attaches to the work of this eccentric but capable botanist that it seems worth while to rescue from obscurity the only paper which he contributed to an English periodical—a paper which appears to have been entirely overlooked. It is not included in Dr. R. E. Call's bibliography printed in his *Life and Writings of Rafinesque* (1895), and does not appear in the Royal Society's *Catalogue of Scientific Papers*, the periodical in question not being included among those catalogued in that work. The nineteen volumes of Loudon's *Gardener's Magazine* (1826–1843) merit more attention than they have received from botanists. They contain much information connected with biography and bibliography, notes bearing upon British botany, and occasionally papers, such as the one here reproduced, of general interest. Rafinesque's contribution appeared in vol. viii. pp. 245–8 (1832).

Another publication imperfectly recorded by Dr. Call may as well be mentioned here. In the bibliography the *Herbarium Rafinesquianum*, issued as "extra of No. 6" of the *Atlantic Journal*, is stated to number forty-eight pages, in two parts, and to have been published in 1833. The copies in the Museum and Kew libraries have a third part, which seems to have been issued in two divisions—the first including pp. 49–64, the second pp. 65–80. I am not sure whether the reference to "my supplemental Flora of North America, 1830–35" justifies the conclusion that this third part was issued after the latter date, as the Flora in question does not seem to have been published, and this was therefore merely a supposititious date; but, so far as I can judge from a casual inspection, the part contains many names which are not taken up in the *Index Kewensis* nor by American authors. In the last number of the *Atlantic Journal* ("winter of 1833") Rafinesque mentions this Supplemental (or, as he there calls it, "additional") Flora of North America at the end of a "Chronological Index" of his "principal botanical works," but he

separates it from those actually published, and in the course of the enumeration refers to it as a future publication.

It will be observed that several names in the following paper are not to be found in the *Index Kewensis*—e. g. *Negundo fraxineum* is cited there as of "Steud. Nom. ed. II. ii. 188," although Steudel quotes it as of Rafinesque; *Belendenia* is quoted (as *Bellendenia*) as of "Rafin. ex Endl."; *Phialospora* is not entered; and so on. I have not, however, attempted to collate the names either with the Kew Index or with American nomenclature.

The additions in square brackets were made by John Denson, who coöperated with Loudon in much of his work.

JAMES BRITTEN.]

REMARKS ON THE ENCYCLOPÆDIA OF PLANTS OF LOUDON, LINDLEY, AND SOWERBY.

At the request of Dr. Mease, I have read with great attention and pleasure the whole of this work: I consider it very valuable, embodying so much useful and practical information. In such an immense compilation of materials, it is no wonder that some errors have crept in; and, as I am quite familiar with our North American plants, I have been particularly struck with those relating to them, I propose to notice some of them, in order that Mr. Loudon may correct them in his new editions, supplements, or journals.

This work appears to consist of three parts, by different hands: the botany by Lindley, the figures by Sowerby, and the history by Loudon. Each of these has peculiar excellence and defects. I have been delighted to see botany returning to the good old plan of wood-cuts, which I have long desired, and done also in some of my works (*Medical Flora*, *School of Flora*, *&c.*). The given figures are mostly excellent or good, but some indifferent or bad; and, in a few instances, they do not represent the intended species. Mr. Lindley shows himself an acute botanist in his part; but, as is too common among the practical botanists, he appears to be led partly by whim rather than principles, in his nomenclature, genera, and species. If this should be matter of mere taste, it would do; but when justice is required towards the founders or detectors of genera and species, an adherence to priority is needful. If so many new genera or subgenera are needful in Cryptogamia, Orchideæ, Pelargonium, &c., why not in Scabiosa, Narcissus, Erica, &c.? He quotes Willdenow instead of Linnæus; Pursh instead of Michaux and myself, &c. I found only one genus (Adlumia) of mine adopted, and another (Lobadium) quoted. My numerous works appear totally unknown. I am called a writer on botanical matters. I have been writing, indeed, for twenty-five years, and published fifty works or pamphlets, some of which I now present to Messrs. Loudon and Lindley through Dr. Mease, in order that my labours may be a little better known in England.* I have already published or indicated 500 new genera, or subgenera, or species presumed new, of plants, many of which are yearly pilfered by others.

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* [These were the *Medical Flora*, *Principes fundamentaux de Somiologie*, and *Précis des Découvertes Somiologiques*.]

Mr. Loudon's history of plants is excellent: I have found in it many novelties and valuable matter. If he had known my *Medical Flora of the United States*, where 600 genera are mentioned, and even their economical properties indicated, he could have added some other peculiarities.

Without further preamble, I enter upon the course of my remarks:—

1. The good genus *Centranthus* of Necker and Decandolle is called *Fedia;* and the *Fedia* is called *Valerianella*. Is it oversight or whim?

2. *Tritonia* of Ker is inadmissible: there are two genera of that name already; this is the third. I have called it *Belendenia*.

3. *Oryzopsis* Mx. is erroneous: *Dilepyrum* Raf., 1808. The same with *Airopsis*, *Arundinaria*, *Portulacaria*, *Erucaria*, *Testudinaria*, *Cucurbitaria*, &c.: all these are inadmissible. *Arundinaria* is *Miegia* of Persoon.

4. *Imperata:* the etymon is stated to be unknown. The genus was dedicated by Cyrillo to Imperati, an Italian botanist.

5. *Cissus quinquefolia* and *Ampelopsis quinquefolia*, mentioned twice under these two names: and it is neither, but my *Quinaria*. See my *Monograph on Vines*, and my *Medical Flora*, vol. ii. p. 120–180.

6. *Nicotiana*. Etymon of Tobacco: it is the name of pipe in Hayti language; and not from Tobago nor Tobasco. See *Anglina*, 1525; and my *Medical Flora*, 1830.

7. *Ipomœa Quamoclit*. False etymon given. *Quamoclit* is the Mexican name; it grows from Florida to Mexico.

8. *Gymnima*. "Vaccine ichor," for "milk or vaccine liquor."

9. *Beta*, a substitute for coffee. Sugar ought to be said instead.

10. *Rhus aromaticum* I called *Turpinia;* but I changed it to *Lobadium*, on finding another genus *Turpinia*. I did not know it was called *Schmaltzia* (after me or my mother's name) by Desvaux. It is also *Myrica trifoliata* of Linnæus.

11. *Narcissus*, "from *narke*." Ovid and all other authors derive Narcissus from the name of a man.

12. *Drosera filiformis* Raf., 1808. Pursh, in 1814, stole this plant from me.

13. *Smilacina*. Bad name. It forms my genera *Clintonia* and *Styrandra*. The *Dracæna borealis* of Aiton is the type of my beautiful genus *Clintonia* (dedicated to Governor Clinton, philosopher, naturalist, and statesman), with bilocular berries. I have found six species of it: those cultivated in England are *C. multiflora* and *nutans*.

14. *Polygonatum*, same as *Polygonum*. My *Sigillaria* or *Axillaria*.

15. *Virgilia lutea*, so called from the yellow wood. You say it has yellow flowers. Michaux's figure has white flowers; and so had the species I saw in bloom. Is a yellow-flowered species cultivated in England? The Virgilias of North America and Mexico form my new genus *Cladrastis;* very different from the Virgiliæ of Africa.

16. Why is *Cydonia* adopted, while *Sorbus* and *Malus* are united to *Pyrus;* nay, also, *Aronia* united, far more removed?

17. *Spiræa corymbosa* of Loddiges is mine; published by me in 1814. See *Précis des Découvertes*, No. 115.

18. *Actæa racemosa* and *Cimicifuga serpentaria*, twice mentioned in two places. It is my new genus *Botrophis*, 1828; *Macrotys*, 1808.

19. *Esimina*, stated to have no meaning. Wrong: name of Indians of Louisiana.

20. *Dionæa*, *Jeffersonia*, *Podophyllum*, &c., stated to be genera with solitary species. Wrong: I have seen and described three species of each, *Dionæa corymbosa*, *sessiliflora*, and *uniflora*; *Jeffersonia Bartoni*, *odorata* and *lobata*; *Podophyllum peltatum*, *montanum* and *callicarpum*. See *Medical Flora*, &c.

21. *Erucaria*, same as *Eruca*. It is my *Pachila*.

22. *Adlumia*. A false etymon given. It was dedicated by me to Adlum, an American cultivator and writer on vines, a friend of horticulture and botany; yet living, and making good American wine.

23. *Camellia*, *Camelina*, and *Camelus* among quadrupeds; three genera of the same name, nearly. I have called the tea shrub *Theaphylla* (meaning divine leaf): a good name, whether a peculiar genus, or *Camellia* to be united to it.

24. *Lupinaster*. Horrible name! *Lupinus* and *Aster*. My *Dactiphyllum*, 1817.

25. *Hypericum virginicum*, with "yellow flowers." Wrong: always purplish. It is my *Triadenum purpurascens*, 1808; different from *Elodea*.

26. *Marshallia*. Marshall was an American botanist, not an Englishman.

27. *Cacalia*. All the American species of this genus are different from the African ones; they form my genus *Mesadenia*; five florets round a central gland: but *Cacalia suaveolens* and *reniformis* constitute another genus, *Synosma* Raf.

28. *Rudbeckia purpurea*. The description and figure different. The fact is, ten species are blended under that name, and form a peculiar genus, which I call *Helicroa*; others call it *Rafinesquia*. [Moench has denominated this genus *Echinacea*, from the hedgehog-like appearance of the paleæ; but whether his genus be earlier or later than those cited by Professor Rafinesque, I must leave to others to determine.—J. D.]

29. *Eria*. Bad name: root of *Erianthus*, and ten other genera. Would not *Erioxantha*, meaning yellow wool, be better?

30. *Microstylis* Pursh, 1815. I called it *Achroanthus*, 1808. The *Liparis* of Lindley is my *Anistylis*, 1825.

31. *Aristolochia*. This genus is a large tribe of plants: I have established in it the genera or subgenera *Glossula*, *Pistolochia*, *Endodeca*, *Siphidia* or *Niphus*, *Einomeia*, *Dictyanthes* (*A. labiosa*), and others. Three or four species are blended under *A. serpentaria*. Your description and figure are two different plants. The figure has large broad cordate leaves; and very different from our common kind, with oblong leaves. See my *Medical Flora*.

32. *Buxus*. We import boxwood into, and do not export it from, America. You mean Armenia, in Asia: misprinted America.

33. *Maclura* Nuttal, 1818. My *Toxylon* (bow-wood), 1817: a previous and better name. We have two other genera of *Maclura* in zoology and mineralogy. The fruit is not esculent. Kunth and

Torrey have committed the absurdity to deem this tree the *Morus tinctoria*, which has oblong edible fruits, Ayac, in Louisiana.

34. *Cocos*. Etymon wrong: comes from *Coco*, palm trees, in the Haytian language. Introduced by Columbus in 1494: see Acosta. Having restored the Haytian language, by collecting 300 words from early travellers, for my *History of American Nations*, I have found many etymons; I shall mention a few:—Yam, from Niames; Potatoes, Batatas; Manioc, Juco; Mangrove, Mangle; Ceiba or Cotton tree, Ceiba; Guava, Guayava; Pimento, Pimento; Guiacum, Guayac; Mancenilla, Manzinila; Cassava, Cazabi; Mahogany, Mahy, Cacao, Copal, Mani; and many more.

35. Two genera, *Bellis* L. and *Belis* Salisbury. This last my *Jacularia*.

36. *Abies* and *Larix*. Why Salisbury quoted instead of Tournefort, 1700; or Adanson, 1750; or Jussieu, 1789?

37. *Gymnocladus*. Our [Kentucky] coffee tree, 80 ft. high in the west, quite straight; seeds used for coffee. This fine tree called a tree, a shrub, and a vine at once.

38. *Juniperus virginiana*. The figure has large round berries; ours has small ovoid warty berries. The figure of *J. bermudiana* more like ours.

39. *Veratrum virginicum* is *Melanthium virginicum*, by description and figure.

40. The asters of North America are a chaos as yet. We have 100 species: you have increased the confusion. Your *Erigeron carolinianum* is certainly an *Aster* by figure, with few rays. *A. Tradescanti* is different from ours. *Aster argophyllus*, three rays in description; five rays in figure. I have prepared a work on this genus for Decandolle, divided into many subgenera by simple or double rays, entire or toothed, seeds smooth or villose, &c. [Mr. D. Don has already grouped *Aster argophyllus* and the closely related species into a genus named *Haxtonia*.—J. D.]

41. *Solidago*. The species of North America are in the same confusion as those of *Aster*. The figures of your *S. bicolor*, *odora*, *mexicana*, *flexicaulis*, do not correspond with the description nor with our species. *S. flexicaulis* is our *S. latifolia*. I am preparing also a work on this genus, by seeds smooth or hairy, rays few or many, &c.

42. *Negundium americanum* Decandolle is my *Negundium* (1808) *fraxineum*. We have a second species in the west.

43. *Nyssa*. All called shrubs: they are all trees with us.

44. *Cucurbitaria*, name too like *Cucurbita*. It is my *Phialospora*.

45. My genus *Phorima*, 1814, for *Boletus*, with irregular cells, omitted; and many other genera of my pamphlet, 1814. [*Précis des Découvertes Somiologiques*, &c.]

46. *Piper*. "None out of tropics." Wrong: a species, *P. leptostachyum*, found in Florida, lat. 28°, by Mr. Ware; described by Nuttall.

47. I have discovered and described thirty-four species of *Trillium* (see my *Medical Flora*); also

48. 30 species and 100 varieties of native North American

grapes, in my *Medical Flora* and my monograph of our American vines.

49. Many of our American botanical authors appear unknown to you. Elliott's *Flora of Southern States*, Torrey's *Flora of Northern States*, Bigelow's *Flora Bostoniensis*, Eaton's *Manual of American Botany*, my *Flora of Louisiana*, 1817; and many more.

50. At the conclusion of the work, nine genera are stated as not reducible to natural orders. I have long investigated this subject, being a follower of natural orders, and never could find yet a genus that I could not refer to them; because, whenever a genus cannot be united to others, it must form the type of a family by itself. Thus, you have many orders in the book with only one genus: these nine could have been used so just as well. Indeed, Decandolle has made an order of *Ceratophyllum*. I could state the affinities of all those mentioned, and the many errors in joining genera to wrong orders, but this would lead too far. I merely invite your attention to my article *Unisema* in *Medical Flora*, whereby you will see that a single species (*Pontederia cordata* of Linnæus) may happen to be the type of not only a new genus, but a new family and new order, when the seed and fruit are totally different from the genus to which the plant is wrongly referred by the copyists of errors. Botany will never be permanently fixed until all errors are exploded and corrected.

C. S. Rafinesque,
Professor of Botany and Natural History, Philadelphia, Jan. 1831.

SHORT NOTES.

Gagea fascicularis in Worcestershire. — This plant was first found in Worcestershire by the Rev. Dr. Cradock, then President of the Worcestershire Naturalists' Club, in 1855, in the parish of Mathon, on the western side of the Malvern Hills, and within a few yards of the Herefordshire boundary. It was still there in fair quantity in 1858, but after that time was "lessened by the plunder of collectors" (*Botany of the Malvern Hills*, ed. 3, p. 108), and finally disappeared. From 1878 onwards I have many times carefully, though unsuccessfully, searched the locality; but last year it was found by Mr. W. H. Jones, of Malvern, about a quarter of a mile distant from the original habitat, but in the county of Hereford. I was therefore agreeably surprised on April 9th when going through a small coppice that had been recently cleared, near Leigh Sinton, some five miles distant from the old station, on the eastern side of the hills, and upon a different geological formation, to find several small patches of the plant flowering freely, and apparently perfectly wild.—Richard F. Towndrow.

Salix hexandra.—Foliage specimens of a willow which I believe to be *S. hexandra* Ehrh. (*S. alba* × *pentandra*) have been sent me by Mr. C. E. Salmon, which were gathered by Mr. J. G. Baker in 1883 by the high road between Shap and Keld. As this hybrid is not

known to me for Britain, may I ask any botanist who can reach that part of Cumberland to collect specimens and cuttings? Mr. Baker reports there were few other trees along the road. — E. F. Linton.

Mathiola sinuata (p. 168).—This plant still flourishes at Santon, on the North Devon coast. Last year at least fifty plants flowered on the cliffs there and on the sandhills in the neighbourhood. Polwhele, in his *History of Devonshire*, 1797, mentions this habitat: "on the rocks adjoining Braunton burrows." It is difficult to conceive that the plant in this neighbourhood is not indigenous. When Polwhele wrote, there was no house within a mile of the place, which is bounded by the sea, moorland, and the three miles of overblown sand known as Braunton Burrows. It is possible that the plants on the sandhills may be extirpated by collectors and trippers, but those on the cliffs are happily inaccessible. — Thomas Wainwright.

Xyris Jupicai Mich. — In my notes on *Xyris* (Journ. Bot. 1899, 499) I included *X. Jupicai* Mich. Fl. Bor. Am. i. 23 (1803) as a doubtful synonym of *X. flexuosa* Muhl. (= *X. torta* Smith). Different authors had taken different views as to the plant inadequately described by Michaux, and no one seemed to have examined the type. Michaux's herbarium forms one of the numerous special collections in the French National Herbarium at the Jardin des Plantes, which I have recently visited. Examination shows at once that *X. Jupicai* has nothing to do with *X. torta* Sm., that is, with the plant generally known as *X. flexuosa* Muhl. The latter has a shortly ciliate unwinged keel on the lateral sepals, while *X. Jupicai* Mich. has a somewhat erose wing on the upper part of the keel of the sepals, which are shorter than the bracts, and have no apical tuft; it is, in fact, the plant generally known as *X. caroliniana* Walt., a species widely spread through the Eastern United States. Michaux gives its distribution on the sheet as "a Maryland ad Floridam." Walter's name dates from 1788 (Fl. Carol. 69). The type of *X. brevifolia* Michx. corresponds exactly with the plant generally so named, and characterized by narrow leaves and small light brown roundish heads.—A. B. Rendle.

NOTICES OF BOOKS.

The Botanists of Philadelphia and their Work. By John W. Harshberger, Ph.D. 8vo, cloth, pp. iv–457. Philadelphia. 1899.

Anyone who has been engaged in similar work will understand that, as the preface tells us, "this book is the outcome of much correspondence and research." It is a handsome volume, embellished by forty-eight illustrations, most of them portraits, and well printed. It is a valuable contribution to the history of botany in America, and the future compiler of the much-needed "Biographical Index of American Botanists" will find it invaluable, so far as Philadelphia is concerned.

Among the earlier men whose biographies are here given are many whose names are intimately associated with the history of botany in England. John Bartram, Humphrey Marshall, James Logan, and, in more recent times, Thomas Nuttall and Frederick Pursh, are names at least as well known in England as in America by contemporary correspondence and collections. This side of their history might, we think, have been more fully recognized; but it may be that this is intentional, as Prof. Harshberger limits himself for the most part to that part of their botanical career which is connected with Philadelphia.

Prof. Harshberger modestly declines to claim completeness for his book, but his belief that "the omissions are few" is, we think, amply justified. The very interesting paper by Mr. F. V. Coville on "The Botanical Explorations of Thomas Nuttall in California" (Proc. Biol. Soc. Washington, xiii. 109–121) was not published in time for reference; it, however, supplements in many particulars our previous knowledge of this able if eccentric botanist, especially by copious extracts from so well-known a book as R. H. Dana's *Two Years before the Mast*. Nuttall was the only passenger on the trading vessel 'Alert,' of Boston, Mass., in 1836, when Dana was a common sailor.

We do not find any mention of Patrick Kerr Rogers, who published at Philadelphia, in 1802, his "inaugural experimental inquiry for the degree of Doctor of Medicine" entitled "An Investigation of the Properties of the Liriodendron Tulipifera, or Poplar-Tree," on the title-page of which he describes himself as "formerly of Ireland, now of Philadelphia." This was dedicated to Benjamin Smith Barton, who, of course, duly figures in Dr. Harshberger's volume, and to George Rogers, M.D., of Newtonstewart, Ireland, a relative of the author. Rogers's name is not included in the *Biographical Index of British Botanists*; perhaps Dr. Harshberger may be able to find out more about him. The account of Rafinesque is mainly taken, as is natural, from Dr. R. E. Call's monograph of his life and writings, published in 1895; it may interest American botanists to know that a paper by the eccentric naturalist, which has been hitherto overlooked, will shortly be reprinted in this Journal.

There are a good many typographical errors in the book, and these sometimes come rather thickly—as in p. 249, where we read of "Dr. Broomfield, Dr. Thomas Belsatter [Bell Salter], and Professor C. C. Babbington." "Dr. Broomfield" is of course Dr. W. A. Bromfield, whose name appears on p. 164 as "W. J. (?) Bromfield." Other slips occur, though rarely; *e.g.* Pursh (whose name was originally Pursch) was born not at Tobolsk, but at Grossenhain, in Saxony.

At times, a cross-reference would have been useful; *e.g.* the passage relating to Nuttall on p. 112 should have been referred to in his biography (pp. 151–159).

The volume includes biographies of living Philadelphian botanists, the author among them. Viewed from a literary or general standpoint, the work would certainly gain by compression. The

details given are sometimes very trivial, and can hardly be even of local interest. Thus of one botanist we are told: "she was blessed with an excellent mother, under whose pious and devoted care her early education was received until she was twelve years old"; while of another we learn that he "suffered a fracture of the hip, July, 1898, and it was thought that he had almost recovered from the effects of the injury, as he was able to be wheeled out in a chair on fine days, but on Friday evening he sank into unconsciousness, from which he never rallied."

We have referred to the need of a biographical index of American botanists, and we cannot conclude this notice of an important contribution to such an undertaking without urging its importance upon those who are in a position to accomplish it. We venture to suggest that some of the energy displayed in formulating new "laws" for nomenclature, and inventing fresh combinations, might be more profitably expended in the compilation of some account of the bygone workers in the field, on whose researches the history of American botany is largely based. Daily experience convinces us of the importance of such a work, and we are certain that there are many American botanists who are capable of carrying it into execution. The biographical notes in Prof. Sargent's *Silva of North America* are models of brevity and completeness, and furnish an example and a foundation for what is required. J. B.

Danmarks blaagrönne Alger (*Cyanophyceæ Danicæ*). Af Johs. Schmidt. I. Hormogoneæ. Copenhagen: Hagerup. 1899.

In the introduction to this first part of an important work the author details the collections to which he has had access in the course of his work, among which are the herbaria of Lyngbye, arranged by MM. Flahault and Gomont, and that of Hofman Bang. The geographical boundaries are also here defined.

The first part of the paper deals with the whole group of *Cyanophyceæ* under the headings of—A. Anatomy (cell-structure, trichomata, sheaths, and branching); B. Development and reproduction; C. Biological remarks (habitat and mode of life); D. Methods of examination of the blue-green algæ; followed by a bibliography.

It has always been a more or less disputed point whether or no the *Cyanophyceæ* can be said to possess chromatophores; and Messrs. Bornet & Flahault, in their "Revision des Nostocacées hétérocystées," throw grave doubt on the statements of those authors who describe these bodies in members of this group. Dr. Schmidt, however, boldly speaks of the chromatophores, but acknowledges that they are very different from those of other algæ, and quotes Dr. Fischer's paper "Untersuchungen über den Bau der Cyanophyceen und Bakterien" in support of his view. Dr. Schmidt says that in order to see these chromatophores it is often necessary to use reagents, though it is sometimes possible to observe their structure in the ordinary living cell. He adds that "they are on a lower standpoint of differentiation from those of other algæ," and in the

cases where true chromatophores of the usual construction have been described, as in *Phragmonema*, *Glaucocystis*, and *Asterocystis*, etc., these algæ have been proved to belong to other groups than the *Cyanophyceæ*, in which they had been wrongly included from a similarity of colour.

The author, like MM. Bornet & Flahault, has failed to find a true nucleus, though these have also been described by other authors. The highly refractive granules are described as being "either evenly distributed through the cells or confined to the neighbourhood of the cell-wall and arranged in rows." Their chemical composition is unknown, except that they are not starch, but whether they contain carbohydrate or albumen has yet to be decided. The vacuoles and cell-walls are also shortly described.

The chapter called "Biological Remarks" is an interesting one, though it consists of a summing-up of well-known facts rather than exhibits any new departure. A good list of shells is given in which perforating algæ have been found in Denmark.

In Chapter D. advice is given as to the treatment of *Cyanophyceæ*, whether in drying, with a view to future investigation, or in mounting for the microscope. According to Dr. Schmidt, the only satisfactory way of preservation is to dry quickly on paper. To preserve specimens in alcohol is very bad, and even a four per cent. solution of formalin, though good, is not to be preferred to simple drying, which allows the plants to be moistened out when necessary. Various reagents and their effects are mentioned, but the author wisely recommends personal experience as the best guide.

The rest of the paper is devoted to systematic treatment of the group, beginning with keys to the orders and genera, which should be most useful in identification. The classification followed is that of MM. Bornet & Flahault; and the figures, of which there are thirty-eight interspersed in the text, are mainly copied from M. Bornet and M. Gomont. It seems a pity that new figures should not be made to accompany such excellent work, for, however good the old figures may be, reproduction of them is always monotonous, and in this case not very successful. One hundred and eighteen species are recorded, of which two are new, *Anabæna baltica* and *Microchæte purpurea*; and new varieties are described of *Anabæna torulosa* Lag., *Gloiotrichia natans* Rabenh., and *Mastigocoleus testarum* Lag.: while three other species are emended. For the convenience of those to whom Dr. Schmidt's native language is unfamiliar, he has given the diagnoses of his novelties in Latin, with critical remarks in English, at the end of his paper. It is a pity that, having such familiarity with the latter language, he did not also give an English translation of his key, and thereby make it more accessible to students of this group of algæ. The second part of Dr. Schmidt's work, dealing with the *Coccogoneæ*, has yet to be published: may we hope that he will add to the practical value of his book by accepting this suggestion?

E. S. B.

Conspectus Floræ Græcæ auctore E. de Halácsy. Vol. i. fasc. i. 8vo, pp. 224 [*Ranunculaceæ—Alsinaceæ.*] Lipsiæ: Engelmann. 1900.

We have here a welcome and much-needed addition to our European Floras. As the publisher points out on the cover, it is nearly a hundred years since the publication of Sibthorp & Smith's *Prodromus Floræ Græcæ*, and although the region is included in Boissier's *Flora Orientalis*, there was ample room for a book specially devoted to Greek plants. The present work, among its other good points, promises speedy completion; it is to appear in from eight to ten fascicles, and will be finished in five or six years, and, as the manuscript is already almost entirely completed, we may hope that the promise will be duly carried out. The introductory matter will be published with the concluding part; the present instalment begins at once with *Ranunculaceæ*.

Generic characters are not given, but those of sections are supplied, with in most cases a short diagnosis of each species, giving the salient points of its differentiation. A very ample bibliography of each plant is given, and the geographical distribution is also fully set forth. Large genera are provided with a carefully drawn up and not too brief clavis, so that the volume is in every respect thoroughly workable. It is excellently printed, the types being well chosen—a matter of detail which affects the usefulness of a book far more than is sometimes supposed. We would suggest the desirability, in future parts, of adding to the heading of each page the name of the genus to which it is devoted, in the manner which has now become fairly general in floras, greatly to the advantage of the worker.

In the absence of explanation it is not quite clear what principle the author adopts as to nomenclature; we note that he retains *Nymphæa* and *Nuphar* in the sense in which they were generally understood until *Castalia* was revived for the former, and that the watercress appears as "*Nasturtium fontanum* Lam. Dict. ii. 185 (*Cardamine*)." Lamarck's name was taken up by Ascherson (Fl. Brandenb. i. 32) in 1864, whose name should be attached to it as authority; Lamarck's specific name, which should be cited from Fl. de France, ii. 499 (1778), would we imagine be ignored at Berlin under the "fifty years' limit" rule which now prevails there. Occasionally we find a citation which strikes us as hardly accurate —*e.g.* "R. Br. Hort. Kew. iv." or even "R. Br. Kew. iv."; the reference being of course to Aiton's *Hortus Kewensis*. But as a whole the Flora impresses us as very carefully done, and we hope the publisher's promise as to its rapid progression may be fulfilled.

J. B.

Humboldt Centenar-Schrift—Wissenschaftliche Beiträge zum Gedächtniss der hundertjährigen Wiederkehr des Antritts von ALEXANDER VON HUMBOLDT'S *Reise nach Amerika.* 8vo, pp. 54, 247, 32, with 2 facsimiles and 2 plates. Berlin: Kühl, 1899. Price 15 Marks.

THIS elegant publication, commemorating the hundreth anniversary of Humboldt's departure for America, is issued under the auspices of the Berlin "Gesellschaft für Erdkunde." It comprises three distinct and separately paged contributions.

The first, by Eduard Lentz, gives some account of the circumstances which led to the expedition, and the difficulties attending its arrangement. It is based on letters, hitherto unpublished, written by the explorer to his patron and friend, Baron de Forell. A number of the letters are published in full, and there is also a brief autobiography, which takes us up to the time just preceding his great expedition. Facsimile reproductions are given of the autobiography, and also of Humboldt's letter of application for a passport.

The greater portion of the book is occupied by a valuable review, by Prof. Engler, of the development of plant-geography in the last hundred years, "Die Entwickelung der Pflanzengeographie in den letzen hundert Jahren und weitere Aufgaben derselben." Among the earlier workers Robert Brown's name finds honourable mention, but no reference is made to the travels of Banks and Solander, which added not a little to our knowledge of the world-flora.

The bulk of Prof. Engler's communication consists of a *résumé* of the most important "floristic literature," in which are contained statements relating to plant-geographical regions and formations. It occupies pp. 28–159, and, while scarcely an exhaustive bibliography, yet gives a good idea of the work done, stating also the authors' names, and in many cases the titles of the book or paper in which the work was published. The arrangement is under generally recognized plant-geographical areas and sub-areas, while names of countries and provinces are given in the margin. This is followed by a section entitled "Die physiologische Pflanzengeographie," the modern Ecology, which, having less tradition, occupies fewer pages. A third section, "Die entwickelungsgeschichtliche Pflanzengeographie" (pp. 195–237), reviews the palæo-botanical and phylogenetic phases. There is also an index of the authors mentioned.

The third paper is by Wilhelm Meinardus, and entitled "Die Entwickelung der Karten der Jahres-Isothermen von Alexander von Humboldt bis auf Heinrich Wilhelm Dove." It fills thirty-two pages, and is accompanied by charts which show at a glance the nature of the development. Humboldt recognized the broad principles; later work has consisted in elaborating the details, more especially in the equatorial zone.

A. B. R.

Key to Tribes and Genera of Melanospermeæ and Floridеæ. By Richard A. Bastow. (Reprinted from Journal and Proceedings of Royal Society of N.S. Wales, vols. xxxii. & xxxiii. (1898–9).)

An illustrated key to any group of plants is as difficult to form as it is easy to criticize when formed, and the keys to *Melanospermeæ* and *Floridеæ* by Mr. Bastow are no exception. Keys in the usual sense these are not, however, being rather a summing-up of the main points of orders and genera, represented in the seas surrounding Australia and the adjacent islands.

The first, which deals with *Melanospermeæ*, is founded, as the author explains in a short introduction, on the works of Harvey, Agardh, and Kützing. The unfinished "Nereis" has caused a careful and of course fruitless search through the libraries of three colonies for the continuation of a work which only reached one volume It seems a pity that such a careful worker as Mr. Bastow should have to waste his time hunting for a book which does not exist, while he is obliged to omit from his key all the information contained in papers and books which presumably are not accessible to students in Australia. Had the author been in touch with any European botanical centre, he would have been able to bring his work up to date, instead of leaving it some twenty odd years behind the times. Since Harvey's day, changes, founded on more minute investigation, have arisen in the classification of brown algæ, and the *Floridеæ* have undergone entire rearrangement by Prof. Schmitz on a wholly different basis from the old lines. All this should have been taken into account in these keys.

As regards *Melanospermeæ*, it may be mentioned that Mr. Bastow retains *Splachnidium* in *Fucaceæ*, while *Chroospora* should be in *Encœliaceæ* instead of being included in *Sporochnoideæ*. *Dictyotaceæ* contains a motley collection from other orders—*Asperococcus*, *Hydroclathrus*, *Stilophora*, and *Cutleria*. *Adenocystis* finds itself in *Chordarieæ* instead of with its relations in *Laminariaceæ*, and *Desmotrichum* is in *Ectocarpaceæ*. Such genera as *Pachydictyon* and *Dilophus*, which are mainly Australian, find no place at all here, possibly being included under *Dictyota*.

The object of these keys was mainly to help the beginner in naming algæ, and no doubt they will be useful in this respect, as the figures, though not well executed, are drawn from good sources; but this only makes one regret the more that such trouble should have been expended to comparatively little purpose. Should Mr. Bastow contemplate the issue of another edition of these keys, we are sure that he would have no difficulty in obtaining help from those who have access to more complete libraries than our colonies can at present boast.

E. S. B.

*ARTICLES IN JOURNALS.**

Annals of Botany (March). — D. H. Campbell, 'Studies on *Araceæ*' (3 pl.).—A. Howard, 'A Disease of *Tradescantia*' (2 pl.).—W. C. Worsdell, 'Structure of female 'flower' in *Coniferæ*.'—T. G. Hill, 'Structure and development of *Triglochin maritimum*' (2 pl.). —A. C. Seward & J. Gowan, *Ginkgo biloba* (2 pl.).

Bot. Centralblatt (No. 13). — W. Schmidle, *Nostochopsis Goetzi*, *Cælastrum Stuhlmanni*, *C. cruciatum*, spp. nn. — K. Müller, 'Zusammenstellung der Lebermoose aus dem Reichslande Elsass-Lothringen' (concl.).—(Nos. 14–16). C. Warnstorf, 'Zur Kenntniss der Torfmoose.'—(Nos. 14, 15). K. Müller, 'Bericht über die in Jahre 1899 in Baden gesammelten Lebermoose.'—(No. 16). T. Herzog, 'Ueber *Neckera turgida*.' — (Nos. 17, 18). G. Kükenthal, 'Species generis *Uncinia* in America meridionali extratropica sponte nascentes.'— (No. 17). E. H. L. Krause, 'Floristische Notizen.' — U. Dammer, 'Ein Vorschlag zur Litteraturfrage.'— (Nos. 19, 20). M. v. Derschau, 'Die Entwicklung der Peristomzähne des Laubmoossporogoniums' (1 pl.).

Bot. Gazette (26 March).—G. Smith, 'Haustoria of *Erysipheæ*' (2 pl.). — E. B. Copeland, 'The Geotropism of Stems.' — J. H. Schaffner, 'The Nutation of *Helianthus*.'—(30 April). R. W. Smith, 'Sporophylls and Sporangia of *Isoetes*' (8 pl.). — R. Thaxter, 'Structure and reproduction of *Compsopogon*.' — J. C. Arthur, 'Cultures of *Uredineæ* in 1899.'

Bot. Magazine (Tokio).—(20 March). T. Ito, '*Zeuxine*' (1 pl.). — T. Makino, 'Bambusaceæ Japonicæ' (cont.). — Id., 'Plantæ Japonenses novæ' (cont.).

Bot. Notiser (Häft. 2: 31 March).—C. Skottsburg, '*Viola*-former från Osel' (1 pl.). — G. Hellsing, '*Cassandra calyculata* funnen i Sverige.'— (Häft 3: 15 May). N. H. Nilsson, 'Om de subarktiska *Poa*-arterna vid Lenafloden.' — J. P. Gustafsson, 'Två svenska *Alopecurus*-hybrider.'—E. Nyman, 'Botaniska excursioner på Java.' L. M. Neumann, '*Utricularia intermedia* × *minor*.' — O. R. Holmberg, 'Botaniska anteckningar.'—O. Nordstedt, 'Sandhems flora.'

Bot. Zeitung (16 April).—F. Reinitzer, 'Ueber die Eignung der Huminsubstanzen zur Ernährung von Pilzen.'

Bull. Bot. Soc. Belgique (14 April). — E. Laurent, 'L'origine des variétés panachées.'—Id., 'Sur la greffe de la pomme de terre.' —J. Chalou, 'Questions de mots.'—T. Durand & E. de Wildeman, 'Matériaux pour la Flore du Congo' (*Loranthaceæ*, A. Engler; *Compositæ*, O. Hoffmann; *Cyperaceæ*, C. B. Clarke).

Bull. Soc. Bot. France (xlvii, 1: March). — A. Franchet, 'Scrofularinées de la Chine.' — E. Malinvaud, 'Doit-on écrire *Pirus* ou *Pyrus*?' — T. Delacour, 'Sur divers *Carex* hybrides.'— (2, 3: 27 April). D. Bois, *Dioscorea Fargesii*. — F. Guégnen, 'Le style et le stigmate des Composées.' — P. Vuillemin, 'Phyllotaxie de l'*Impatiens glanduligera*.' — L. Lutz, 'Sur la végétation dans

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* The dates assigned to the numbers are those which appear on their covers or title-pages, but it must not always be inferred that this is the actual date of publication.

l'huile.'—J. Foucaud, 'Additions à la flore de Corse.'—A. Daguillon, 'Un fruit anormal de *Pyrus Malus*.'—P. Fliche, *Pyrus cordata* Desv. M. Gandoger, 'Notes sur la flore Espagnole.'

Bull. Torrey Bot. Club (24 March).—A. W. Evans, 'New Genus of Hepaticæ from Hawaiian Islands' (*Acromastigum:* 1 pl.). — E. L. Morris, 'Revision of *Plantago patagonica*.' — F. S. Earle, 'Florida Fungi.' — H. H. Rusby, 'South American Plants.'— (21 April). F. E. Lloyd & L. M. Underwood, 'Lycopodiums of N. America' (3 pl.). — P. A. Rydberg, 'Rocky Mountain Flora.'— Id., '*Prunus insititia*.' — F. G. Smith, 'Peculiar case of contact irritability.' — W. R. Maxon, *Asplenium respertinum*, sp. n. — S. C. Stuntz, 'N. American species of *Eleutera* (*Neckera*).'

Gardeners' Chronicle (21 April). — *Polypodium Harrisii* Jenm., sp. n.

Journal de Botanique ("Mars.").—P. v. Tieghem, *Aristolochia*. — N. Patouillard & P. Hariot, *Lentinus Erringtonii*. — A. Chabert, *Euphorbia Durandoi* & *E. lugubris*.— R. Chodat & C. Bernard, 'Sur le sac embryonnaire de l'*Helosis guyanensis*' (2 pl.). — R. Maire, 'Evolution nucléaire chez les *Endophyllum*' (1 pl.).

Malpighia (xiii. fasc. 7–9 : received 11 May). — O. Mattirolo, 'Bibliografia botanica italiana.' — A. Villani, 'Sull' affinità e discendenza delle Crocifere' (1 pl.). — Id., 'Tubercoli radicali delle Leguminose' (1 pl.).—R. Pirolta & E. Chiorenda, 'Illustrazione di alcuni Erbarii antichi Romani' (5 pl.). — T. Ferraris, 'Di un nuovo Ifomicete parassita delle Arance' (*Oidium Citri aurantii:* 1 pl.).

Mémoires de l'Herb. Boissier (No. 10 : 30 March). — H. Schinz, 'Zur Kenntnis der Afrikanischen Flora.' — (No. 11 : 30 April). F. Stephani, 'Species Hepaticarum.' — (No. 12 : 30 April). F. Meister, 'Zur Kenntnis der europäischen Arten von *Utricularia*' (3 pl.).

Oesterr. Bot. Zeitschrift (April & May). — F. Vierhapper, *Arnica Doronicum* Jacq. (1 pl.). — J. M. Polák, 'Die Staminodien der Scrophulariaceen.' — L. & K. Linsbauer, 'Teratologische Befunde an *Lonicera tatarica*' (1 pl.). — (April). J. Rick, *Sclerotinia Bresadolæ*, sp. n. — K. Rechinger, *Lamium Orvala* & *L. Wettsteinii*.— J. B. Scholz, 'Studier über *Chenopodium opulifolium*' (concl.).— (May). B. Horák, 'Zur Flora Montenegrós.' — R. v. Wettstein, 'Die nordamerikanischen Arten der *Gentiana* § *Endotricha*' (1 pl.).

BOOK-NOTES, NEWS, &c.

At the meeting of the Linnean Society on April 19th, Messrs. W. B. Hemsley and H. H. W. Pearson read a paper "On some Collections of High-level Plants from Tibet and the Andes." Mr. Hemsley gave a brief history of the botanical exploration of Tibet, followed by an account of the unpublished collections presented to Kew by Captain Wellby and Lieutenant Malcolm, by Captain Deasy and Mr. Arnold Pike, and by Dr. Sven Hedin.

These collections were all made at great altitudes in Central and Northern Tibet; few of them below 15,000 ft., and some of them at 19,000 ft. and upwards. The highest point at which flowering plants had been found was 19,200 ft. above the level of the sea. The plants recorded by Deasy and Pike at altitudes of 19,000 ft. and upwards are:—*Corydalis Hendersoni*, *Arenaria Stracheyi*, *Saxifraga parva*, *Sedum Stracheyi*, *Saussurea bracteata*, *Gentiana tenella*, *G. aquatica*, an unnamed species of *Astragalus*, and an unnamed species of *Oxytropis*. These are the greatest altitudes on record for flowering plants. Deep-rooting perennial herbs having a rosette of leaves close to the ground, with the flowers closely nestled in the centre, are characteristic of these altitudes. The predominating natural orders are:—*Compositæ*, *Leguminosæ*, *Cruciferæ*, *Ranunculaceæ*, and *Gramineæ*. The *Compositæ* largely predominate, and the genus *Saussurea* is represented by numerous species. Specimens of about a dozen species were shown to illustrate the great diversity exhibited by this genus in foliage and inflorescence. *Liliaceæ* and the allied orders were very sparingly represented. Two or three species of *Allium* occur; one of them, *A. Semenovii*, in great abundance up to 17,000 ft. None of the collections contained any species of orchid.

Mr. Pearson's remarks on the Andine Flora had special reference to Sir Martin Conway's small collection brought from Illimani, in the Bolivian Andes, in 1898. Out of forty-six species of flowering plants obtained by Sir Martin Conway, seven are from 18,000 ft. or above it, two being as high as 18,700 ft. These, the highest Andine plants on record, are *Malvastrum flabellatum* Wedd. and *Deyeuxia glacialis* Wedd. Thirty-nine species in this collection were found above 14,000 ft.; these belong to thirty-four genera and twenty-one natural orders; fifteen (*i. e.* about three-eighths of the collection) are *Compositæ*. Of the thirty-four genera, one only—*Blumenbachia*—is endemic to South America. The species, with one exception, are confined to the Andes, eight or nine of them not being found outside Bolivia. In the collection made by Mr. Fitzgerald's expedition in the Aconcagua valleys between 8000 and 14,000 ft., ten genera (*i. e.* one-quarter of the whole) are endemic in South America. The contrast between this and the small endemic element in the Conway collection from above 14,000 ft. gives additional support to the generalization that the flora of high levels is more cosmopolitan than that of low levels.

The Report of the Botanical Exchange Club for 1898 by Mr. James Groves has just been published. It contains a number of interesting notes upon critical forms, some of which we hope to extract later for the benefit of our readers. It would, we think, be helpful if some indication were given of the place where copies could be obtained; at present the only address is that of the printers.

The recently issued "Rules for compiling the Catalogues in the Department of Printed Books in the British Museum" contain much that is useful and suggestive to librarians and bibliographers, and are serviceable as a guide to the principles on which the entries in the Museum Catalogue are drawn up. Those who affirm that

language was given us to conceal our thoughts will find in these Rules ground for extending their conclusions, and will assume that the aim of a cataloguer is to make books undiscoverable. The Rules may be all that is admirable and ingenious, but they result in such approved entries as the following, which we take from a single page of examples:

"History. A History of Painting from Fra Angelico to Velasquez.
Book. A first Book on Algebra.
Art. Le livre intitulé l'art de bien mourir."

It would be difficult to conceal more effectively the works placed under these three headings.

The eleventh *Annual Report of the Missouri Botanic Garden* contains papers on the diseases of *Taxodium distichum* ('peckiness') and *Libocedrus decurrens* ('pin-rot') by Hermann von Schrenk; on Agaves flowering in Washington, by J. N. Rose; and revisions of the American species of *Euphorbia* § *Tithymalus* by J. B. S. Norton, and of the species of *Lophotocarpus*, by J. G. Smith. It is unnecessary to say that the volume is admirably printed and lavishly illustrated.

Mr. G. C. Druce announces in the 'Pharmaceutical Journal' that he has in preparation 'An Ecological Flora of the British Isles,' in which he hopes to show "more particulars as to the exact place of growth, altitude and distribution, than is given in the usual text-books." Such a work, if carefully done, will be both useful and interesting; but we trust Mr. Druce will observe due economy in supplying information as to the "exact place of growth" of our rarer species.

The first part, containing 101 plates with descriptions, of the "Illustrations of the Botany of Captain Cook's Voyage Round the World in H.M.S. 'Endeavour' in 1768–71" has just been issued by the Trustees of the British Museum. The descriptions are printed verbatim from the manuscripts of Banks and Solander. Mr. Britten has carefully compared the plates and descriptions with the original drawings and the specimens in the Banksian Herbarium, and has added such information as these supply. He has also added determinations, in accordance with the nomenclature at present adopted. We hope to notice the work at greater length in an early issue.

A new part of the *Flora Capensis*, completing vol. vii., has just been published. It concludes the *Gramineæ*, and is entirely the work of Dr. Stapf.

The *Daily Chronicle*, although it does not reach the level of the *Daily Mail* as an instructor in natural history, does its best. Here is a piece of information from its issue of April 24th:— "While it seems to be beyond question that the cultivated rose is a comparatively recent importation into this country, it is equally certain that the delicate pink and white roses of our hedgerows, with their fragile petals and lovely bloom, are, if not indigenous to the soil, at least as old as the association of the name of St. George with England."

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SENIOR ASSISTANT, DEPARTMENT OF BOTANY, BRITISH MUSEUM (NATURAL HISTORY)

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A. Eryngium petiolatum. B. E. articulatum.
C. E. prostratum. D. E. [illegible]

NOTES ON ERYNGIUM.

By James Britten, F.L.S., and E. G. Baker, F.L.S.

(Plate 411.)

The following notes are the result of an examination of some of the species of *Eryngium* in the National Herbarium.

I. North American Species.

Eryngium aquaticum L. Sp. Pl. 232 (1753). This name is assigned by Britton and Brown (Ill. Fl. N. Amer. ii. 522) to the plant for which S. Watson (Index, p. 422) and other authors have adopted the name *yuccifolium* of Michaux (usually spelt *yuccæfolium*). It is similarly applied by Delaroche (Eryngium, p. 57), but that author quotes the second, not the first edition of the *Species Plantarum*, and the views of Linnæus, as is well known, had materially altered between the dates of publication of the two editions. A careful investigation of the synonymy and of the Linnean types has convinced us that the *aquaticum* of ed. i. is not the *yuccifolium* of Michaux.

The description of the plant in Sp. Pl. ed. i. stands as follows:—

"*aquaticum*. 2. Eryngium foliis gladiatis serrato-spinosis: floralibus indivisis.
Eryngium foliis gladiatis utrinque laxe serratis: summis tantum dentatis subulatis. *Gron. virg.* 146.
β. Eryngium lacustre virginianum, floribus ex albido cæruleis, caule & foliis ranunculi flammei minoris. *Pluk. alm.* 137. [*Phyt.* 396, fig. 3.]
Habitat in Virginia 2f."

In the Linnean Herbarium this name is represented by two sheets pinned together: the first having written on it "aquaticum" and the second the figure "2," both in Linnæus's hand. The second bears in Gronovius's hand the number "500" followed by the phrase from Plukenet which Linnæus quotes for his variety β: to this Linnæus has added a note all of which we are not able to read, but which seems to show that he thought the specimen different from the plant figured by Plukenet. Each of these specimens represents the plant now known as *E. virginianum* Lam.; the Gronovian specimen is doubtless that referred to in Hort. Cliff. 88 (n. 5) as "nobiscum a D. D. Gronovio communicata."

Excluding for the present the variety β, it seems clear that the Gronovian plant was the only material consulted by Linnæus in establishing his *aquaticum*. The only synonym he cites is that of Gronovius (Fl. Virg. p. 146), where "Eryngium aquaticum floribus albis Clayt. n. 500" is quoted by Gronovius as a synonym—the

number 500 being that of Clayton's plant in the Linnean and National herbaria—and it is from this that Linnæus derived the name *aquaticum*.

It may be urged with some show of reason that Linnæus's descriptive phrase "foliis gladiatis serrato-spinosis: floralibus indivisis" may be taken as referring to *yuccifolium*. But it must be remembered that he was contrasting *aquaticum* with *fœtidum* (which immediately precedes it and which is characterized as having "floralibus multifidis"); while as to the former, if it be urged that the leaves of *virginianum* are not what we should now call "gladiatis," they are at least as much so as those of *fœtidum* to which he applies the same term; and it may be noted that Gronovius has "gladiolatis," not "gladiatis" as cited by Linnæus.

In making his variety β, Linnæus again follows Gronovius, who says (*l. c.*): "Hujus varietas est Eryngium lacustre Virginianum floribus ex albido cæruleis, caule & foliis Ranunculi flammei minoris D. Banister. Plukn. Alm. p. 136 [137], cui folia sunt lanceolato-linearia utrinque subulata, sessilia, floresque pedunculati." A reference to Plukenet's specimens in Herb. Sloane (xcii. f. 62 and xciv. f. 188) shows conclusively that his plant was *E. virginianum*, one of them being the slender few-headed specimen on which his figure is based. This plant of Plukenet Lamarck cites as synonymous with his *virginianum*.

From what has been said it seems clear that the whole of the material present to Linnæus when he drew up the description of *aquaticum* for his first edition belongs to the plant now generally known as *virginianum*, which latter must be reduced to a synonym of the Linnean species.

In the second edition of the *Species Plantarum*, Linnæus corrected the synonymy given for *fœtidum* in ed. i.* by removing from that species "E. americanum, yuccæ folio, spinas ad oras molliusculis. Pluk. alm. 13 [137] t. 175, f. 4, Raj. suppl. 239. Moris. hist. 3. p. 167" and "E. foliis gladiatis utrinque laxe serratis: denticulis subulatis. Hort. Cliff. 88. Roy. lugdb. 529." These—which are

---

* Linnæus (*l. c.*) quotes "Scorpii spina Hern. mex. 222" as a synonym of *E. fœtidum;* in ed. ii. he transfers this to *E. aquaticum*. Hernandez has a figure of the plant, and describes it thus:—"*Ocopiaztli*, quam alij *Hoitzcolotli*, seu Scorpij spinam vocant, herba est spinifera, folia proferens Cirsij spinis horrentia prælonga et angusta, caules longos, teretes, ac læves, quorum supremis partibus hærent capitula spinis horrida, illis Dipsaci haud dissimilia, ac flosculis contecta purpureis. Provenit *Tonayuce* montanis, humidisque locis." This seems to us very closely allied to, if not identical with, *E. axilliflorum* Turcz. in Bull. Soc. Nat. Mosc. xx. 172 (1847), from the peak of Orizaba. We would refer to the same species a plant recently distributed as "E. cymosum Delaroche," from Pachuca, Prov. Hidalgo, *Pringle* 6939, and, according to Messrs. Coulter and Rose (Proc. Washington Acad. Sci. i. 125 (1900)), accepted as such by Mr. Hemsley. This plant, however, differs in several points from Delaroche's plate and description (p. 63, t. 31), notably in the marginal teeth of the leaves, and we cannot consider the two identical. Palmer's Rio Blanco plant (no. 681, 1886 collection) referred doubtfully to *E. cymosum* by Sereno Watson (Proc. Amer. Acad. xxi. 415) more closely resembles Delaroche's figure.

undoubtedly *yuccifolium*—he placed under *aquaticum*. To this importation is owing the confusion that has arisen: Miller (1768) and subsequent authors—*e. g.* De Candolle, Delaroche, Torrey and Gray, and J. B. Ker (Bot. Reg. t. 372)—cite ed. ii. Sp. Pl. as the authority for *aquaticum*. Britton & Brown indeed quote the name from ed. i., but their plant is the plant of ed. ii., as represented by the synonymy just quoted—i. e. *E. yuccifolium*.

Plukenet's figure does not very satisfactorily represent the plant, but his specimens in Herb. Sloane (xciii. 144 and xcvi. 20) are unmistakeable—indeed, there is no possibility of confusing the two species.

It should be noted that, in correcting the synonymy as above, Linnæus retained under *fœtidum* the phrase "E. foliis gladiatis," etc., as far as it referred to the plant so called by Gronovius on p. 30. This, of which we have the type (Clayton 282) in the National Herbarium, is *E. yuccifolium*, and apparently had not been seen by Linnæus; and this may explain his not having removed it. This last-named species he had come to understand more thoroughly, as is shown by his having removed from it plants which he knew belonged elsewhere, and by his full description in Syst. ed. xii. 201 (1767).

To the synonymy of *E. yuccifolium* must be added *E. aquaticum* and *E. fœtidum* of Walter's *Flora Caroliniana* (p. 112) as is shown by the specimens—poor, but sufficient—in his herbarium.

The following is the synonymy of the two species:—

E. AQUATICUM L. Sp. Pl. ed. i. 232 (1753); ed. ii. 336 (1762) ex parte.
E. fœtidum L. *l. c.* ed. i., 232, quoad syn. Hort. Cliff., Gronov., Pluk., Raj., excl. syn. Sloan.; ed. ii. 336, excl. syn. Gronov.
E. virginianum Lam. Encycl. Meth. iv. 759 (1795–6); Delaroche, Eryngium, p. 48, t. 29 (1808); Torr. & Gray, Fl. N. Amer. i. 605 (1840); Chapm. Fl. S. U. S. 160 (1860); S. Wats. Index, 422 (1878); Coulter & Rose, Revis. N. Amer. Umbellif. 95 (1888); Britton & Brown, Ill. Fl. N. Amer. ii. 522 (1897); **et auct. amer. plur.**
E. Plukenetii Elliott, Bot. S. Carol. i. 582 (1821).

E. YUCCIFOLIUM Michaux, Fl. Bor. Amer. i. 164 (1803); Chapm. Fl. S. U. S. 160 (1860) (*yuccæfolium*); S. Wats. Index, 422 (1878) (*yuccæfolium*); Coulter & Rose, Revis. N. Amer. Umbellif. 94 (1888) (*yuccæfolium*).
E. aquaticum L. Sp. Pl. ed. ii. 336 (1762), ex parte, non ed. i.; Mill. Gard. Dict. ed. viii, n. 7 (1768); Walt. Fl. Carol. 112 (1788); Delaroche, Eryngium, p. 57, t. 41 (1808); Torr. & Gray, Fl. N. Amer. i. 604 (1840); Britton & Brown, Ill. Fl. N. Amer. ii. 522 (1897); et auct. amer. plur.
E. fœtidum L. Sp. Pl. ed. i. 232 (1753) quoad pl. Gronov.; ed. ii. 336 (1762) quoad syn. Gronov.; Walt. Fl. Carol. 112 (1788).

E. BALDWINI Sprengel, Syst. i. 870 (1825). The confusion created by Chapman in his *Flora of the Southern United States*

(1860) with regard to this plant is corrected by S. Watson in his *Index*, and the conclusions of the latter are accepted by Chapman in his latest (third) edition (1897). Chapman's mistake seems to have originated with Rugel's plants, collected in 1843 and distributed by Shuttleworth. In this set, No. 278 bears on its printed ticket the name *E. Baldwini*, but the numerous specimens so labelled in the National Herbarium all belong to *E. prostratum* Nutt. The true *Baldwini* appears in Rugel's collection—Nos. 279, 280, 281—under the name *E. filiforme* Shuttl., which Asa Gray (Pl. Wright. p. 78) rightly reduced to *Baldwini*. Shuttleworth's 279 is an extremely slender form with filiform leaves. For the sake of comparison we have figured specimens of *E. prostratum* Nutt. and *E. filiforme* Shuttl. from the types in the National Herbarium. We have given figures of the involucral bracts, bractlets, and heads, showing the distinctive characters of the two species.

E. INTEGRIFOLIUM Walt. Fl. Carol. 112 (1788). Messrs. Coulter & Rose (Rev. N. Amer. Umbell. p. 102) say that it "seems impossible to determine" this plant. The specimen in Walter's Herbarium, however, although but fragmentary, is clearly identical with *E. virgatum* Lam. as was indeed correctly indicated by Sprengel (Syst. i. 870) in 1825. Walter's name must therefore be substituted for Lamarck's, over which it has a priority of seven or eight years. Under this head may be mentioned a name frequently quoted in books as "*E. americanum* Walter." As Messrs. Coulter & Rose point out, there is no such plant:—"that name was first used by Sprengel in Roem. & Schultes Syst. [vi. 337], and referred by him to Walter, but he copied [abridged] the description of Walter's *E. integrifolium*." An earlier citation of the name will be found in Michaux, Fl. Bor. Amer. i. 163 (1803), where it is doubtfully referred to his *E. ovalifolium* (=*E. virgatum* Lam.). The plant is generally referred with doubt to *E. prostratum* Nutt., as in Britton & Brown's *Illustrated Flora*, and in the *Index Kewensis*, where *E. americanum* is erroneously cited as "Walt. Fl. Carol. 102." Specimens distributed under the name *americanum* by Elihu Hall (no. 242)=*E. prostratum*.

E. PETIOLATUM Hook. Fl. Bor. Amer. i. p. 259 (1833). Douglas's specimens, five in number, from "overflowed plains of the Multnomah, 1825," are in the National Herbarium, and are of especial importance, as Hooker (Fl. Bor. Amer. i. 259) says of the plant:—"Of this I possess but one, and that an imperfect specimen." The petioles are long and nodosely articulate (6–8 in. long in the lower leaves); the involucral bracts are subulate, ciliate, spinose, rigid, and spinous tipped; the bractlets are longer than the globose head. Asa Gray (Proc. Am. Acad. viii. 385 (1872)) makes a variety, *juncifolium*, on a plant gathered in Oregon by Elihu Hall, no. 200. We have compared the two, and cannot separate Hall's plant from Douglas's type. Messrs. Coulter and Rose (in Revis. Umbell. 98) quote Hall's plant as *E. articulatum* Hook. Lond. Journ. Bot. vi. 232, 1847. The accompanying figures (Plate 411, A, B), taken in

each case from types, show that *E. articulatum* and *E. petiolatum* are abundantly distinct, the bracts and bractlets giving the heads a very different appearance. Since our plate was prepared, Messrs. Coulter and Rose have kindly sent us their specimens for comparison, with descriptions of the two species prepared for their forthcoming "Second Revision of North American Umbelliferæ." We are interested to find that specimens of *E. articulatum* lately received by them from the locality where Geyer collected the plant on which Hooker's original description was based, have led them to the conclusion at which we had arrived. These authors now regard *E. Harknessii* Curran as synonymous with *E. petiolatum*. We do not know what their *E. petiolatum* (Revis. Umbell. 97) may be, but it can hardly be either *E. petiolatum* Hook. or *E. articulatum*. In view of the confusion that has arisen between the two species, the following synonymy may be found useful :—

E. PETIOLATUM Hook. Fl. Bor. Amer. i. 259 (1833); Torr. & Gray, Fl. N. Amer. i. 604 (1840); Torr. Bot. Wilkes, 315 (1873), excl. syn.; Brewer & Watson, Bot. Calif. i. 255 (1876), excl. syn.
E. petiolatum var. *juncifolium* A. Gray in Proc. Amer. Acad. viii. 385 (1872); S. Watson, Index, 421, excl. syn.
E. articulatum Coulter & Rose, Revis. N. Amer. Umbellif. 98 (1888); Howell, Fl. N. W. Amer. i. 263 (1898); non Hook.

E. ARTICULATUM Hook. Lond. Journ. Bot. vi. 232 (1847).
E. petiolatum Torr. Bot. Wilkes, 315 (1873), quoad syn.; Brewer & Watson, Bot. Calif. i. 255 (1876), quoad syn.
E. petiolatum var. *juncifolium* S. Wats. Index, 421, quoad syn.
E. Harknessii Curran in Bull. Calif. Acad. iii. 153 (1885).

II. Other Species.

E. NASTURTIIFOLIUM Juss. ex Delaroche, *Eryngium*, p. 46, t. 17. This is founded upon Houstoun's "Eryngium americanum supinum nasturtiifolium," of which we have a poor specimen collected by him at Vera Cruz in 1731, and an excellent pencil drawing, also by Houstoun. It is not mentioned as a Vera Cruz plant by Mr. Hemsley in Bot. Biol. Centr.-Amer.

E. ORIENTALE Mill. Dict. ed. viii. no. 6, queried as = *amethystinum* in *Index Kewensis*, is rightly so referred. This is the "E. Orientale foliis trifidis" of Tournefort (Cor. 23), which Delaroche places among his "species minus notæ aut dubiæ," with the note :—"Folium vidi in herbario Vaillantii hoc nomine insignitum, et Eryngio amethystino ut mihi videtur pertinens." There is in the Banksian Herbarium a sheet from Gronovius's Herbarium, sent him by Vaillant, and written up "Oriens. Tournefort," with the Tournefortian name, on which Dryander has annotated :—"Delaroche has it among dubiæ, p. 66, n. 8. He had only seen a leaf in Vaillant's herb. which he took to be amethystinum. I believe he is right. I rather believe that this specimen is from the Duch gardens, as it is not said to be from Vaillant, and there is in the

Herb. a magnificent specimen from Miller's herbarium, which Houstoun had brought either from Holland or Paris, it having a ticket in Houstoun's handwriting."

E. PALLESCENS Mill. Dict. ed. viii. no. 5 ("pallescente," but corrected to *pallescens* on last page of book). In the *Index Kewensis* this plant is identified with *E. amethystinum*, herein following, but with less caution, the lead of Steudel, who enters it as "*E. amethystinum* var.?" and does not place it in italics. In DC. Prodr. iv. 97, it occupies the first place among the "species non satis notæ." It is, however, correctly cited in Aiton's *Hortus Kewensis* (ii. 327) as a synonym of *E. Bourgati* Gouan, and it is strange that this identification should have been overlooked by all subsequent writers. It was probably due to Solander, who similarly identifies Miller's specimens in the Banksian Herbarium. These examples, as in other cases of plants from Miller's herbarium, do not bear his name, being labelled simply "Hort." (in some cases "Herb."); but the connection is made evident by the fact that, when Miller's herbarium was acquired by Banks in 1774, Solander ticked off the species received in Banks's copy of the eighth edition of the *Gardeners Dictionary*, and at the same time wrote up the specimens; both description and plant are thus indicated by Solander. Moreover, we have two sheets of the same plant from Chelsea Gardens, sent to the Royal Society in accordance with the Charter in 1738 and 1750 respectively; one of these bears the Tournefortian synonym. It is interesting to note that Miller was precise as to its distinctness from *E. amethystinum*, of which, he says, it had been "supposed by many to be only a variety"; "I have propagated it by seeds more than thirty years without finding the least alteration, so that I make no doubt of its being a distinct species." It may perhaps be worth noting that, according to contemporary testimony, Linnæus confused this plant with his *E. alpinum*. Gouan, when establishing *E. Bourgati* (Illustr. Bot. p. 7, 1773), says: "Communicavi olim cum Linnæo, qui ad *alpinum* in litteris revocavit"; and Solander, in his MS. notes on *alpinum*, says: "Descriptio foliorum in *Linn. Mantissa*, p. 349, certe ex *Eryngio Bourgati* desumata; ambæ species ab auctoribus *alpinæ* vocantur." Willdenow (Sp. Pl. i. p. 1360 (1797)) cites *E. alpinum* L. Mant. under *E. Bourgati*; and the *Index Kewensis*, following Steudel and De Candolle, places here *E. alpinum* Lapeyr. (Hist. Abr. Pl. Pyren. p. 137 (1813)). The synonymy of the plant is therefore:—

ERYNGIUM PALLESCENS Mill. Dict. ed. viii. no. 5 (1768) (*pallescente*).
E. alpinum L. Mant. 349 (1771), non Sp. Pl.
E. Bourgati Gouan, Illustr. p. 7, t. iii. (1773).

DESCRIPTION OF PLATE. — A. *Eryngium petiolatum* Hook. B. Flowering head of *E. articulatum* Hook. C. *E. prostratum* Nutt. D. *E. filiforme* Shuttl. 1. Involucral bract, 2. bractlet, 3. flower (all magnified).

CARDIGANSHIRE GLEANINGS.

By Rev. E. S. Marshall, M.A., F.L.S.

The following plants were noticed during a stay of four weeks, in August, 1899, at Aberayron, a pretty but remote little watering-place. Throughout the weather was oppressively hot; also the roads were as a rule in poor order for bicycling, and very hilly: these combined causes prevented my search from being as wide or thorough as I should have liked to make it. The neighbourhood appears to be botanically remarkable rather from the absence of many species common elsewhere, than from the presence of many interesting or rare ones; however, a considerable number of additions were made to the list for Watson's v.-c. 46, and the bramble-flora is evidently rich. My thanks are due especially to Mr. Arthur Bennett and Rev. W. Moyle Rogers; Messrs. H. & J. Groves and Rev. E. F. Linton have also helped with determinations. An asterisk denotes a new vice-comital record.

Ranunculus Lenormandi F. Schultz. Ditches between Bethania and Llyn Fanod.—*R. hederaceus* L. is not uncommon.

Nymphæa lutea L.; *Castalia speciosa* Salisb.* Llyn Fanod.

Fumaria Boræi Jord.* Roadside bank, Aberayron; only once seen. — *F. muralis* Sonder.* Newquay; in several places about Aberayron.

[*Cheiranthus Cheiri* L. Quite naturalized on sandstone cliffs, Newquay.]

Lepidium Draba L. occurs in waste ground near the sea at Aberayron.

Brassica sinapioides Roth.* Cliffs, Aberayron, in profusion; probably native. — *B. alba* Boiss.* Cultivated ground near Aberayron.—An annual plant bearing very bright yellow flowers, amplexicaul subentire stem-leaves, and long-beaked falcate smooth pods with strongly anastomosing veins, found in considerable quantity in fields at Bethania, may possibly (Mr. Bennett suggests) be *B. juncea* L.

Coronopus didymus Sm.* Newquay, Aberayron; not a native, I think.

Viola ericetorum × *Riviniana*.* Moorland above Aberarth, with the parents; quite sterile.—*V. ericetorum* was remarkably luxuriant in this locality. — *V. lutea* Huds. Frequent about Bethania and Cross Inn.

Sagina ciliata Fr.* Stony path by Aberayron Church; pedicels and sepals glandular, as in *S. patula* Jordan, of which it may be a weak state. I did not ascertain from whence the material of this path had been brought.

Lepigonum rupicola Kindb. Frequent on the cliffs from Aberayron to Newquay.

Hypericum dubium Leers. Plentiful; more so, I fancy, than *H. perforatum*.

Lavatera arborea L.* Rocky cliffs, Newquay; abundant at one spot. Probably, but not certainly native.

Radiola linoides Roth.* Llanbadarn-Trefeglwys.

Vicia sepium L.* Not uncommon about Aberayron; it has now been recorded for every British vice-county.—*Prunus insititia* Huds. Abundant in hedges; Aberayron, Aberarth, Llanerch-Aeron, &c.—*P. Cerasus* L. was also noticed occasionally, but only as an obvious introduction.

Rubus suberectus G. Anders. Monachty Dingle, near Aberayron, sparingly; the only one of the § *Suberecti* seen by me.—*R. cariensis* Rip. & Genev.* Lower part of the Afon Drowy valley, near Newquay; hedge between Aberayron and Llanerch-Aeron.—*R. Lindleianus* Lees. Near Aberayron; apparently rare. — *R. erythrinus* Genev.* Between Aberayron and Newquay. — *R. Bakeri* F. A. Lees.* A variant form of this was gathered at Bethania and near Cross Inn. — *R. nemoralis* P. J. Muell. var. *Silurum* A. Ley.* Plentiful about Bethania and Pennant; also at Llanrhystyd—probably common throughout the district.—*R. pulcherrimus* Neum.* Bethania (abundant); Aberayron; near Newquay.—*R. dumnoniensis* Bab.* Between Aberayron and Newquay; plentiful at Bethania. —*R. Selmeri* Lindeb. In several places between Newquay and Aberayron. — *R. silvaticus* Wh. & N.* A very handsome bramble, with the leaves much cut and the stems curiously spotted with red, which occurred in two stations near Llanerch-Aeron, is referred by Mr. Rogers to a laciniate-leaved form of this species. A very different-looking plant, from a lane near Monachty, "recalls both *R. silvaticus* and *R. chrysoxylon*, without exactly agreeing with either"; another, from the same lane, "in some respects recalls *R. hesperius*, and in others *R. danicus*; but it seems distinct from both." — *R. Sprengelii* Weihe.* Between Llanina and Llanarth; only seen in small quantity at one spot. — *R. pyramidalis* Kalt.* In two localities near Newquay; also ('forma eglandulosa') at Llanerch-Aeron.—*R. leucostachys* Schleich. Common. A beautiful form or variety, in some respects recalling *R. lasioclados*, grows at Llanarth and in the lower Afon Drowy valley. — *R. lasioclados* Focke, var. *angustifolius* Rogers.* Remarkably common and characteristic about Newquay and Aberayron; when in flower, its bright rose-coloured petals contrast admirably with the white-felted under side of the leaves. — *R. mucronatus* Blox. Lane going down to the sea, about three miles from Aberayron, towards Newquay. — *R. hystrix* Wh. & N.* Monachty Dingle and Hengeraint Woods, near Aberayron. — *R. dasyphyllus* Rogers ('R. pallidus' Bab., non Wh. & N.). Monachty Dingle. Llanerch-Aeron, and Afon Drowy valley. — *R. hostilis* Muell. & Wirtg.* Roadside near Monachty; Mr. Rogers says that he can see no difference between this and the Kentish plant. — *R. viridis* Kalt.* A very beautiful form of this is locally abundant near the head of Monachty Dingle; *R. serpens* Weihe* (new for Wales) occurs not far off.—*R. dumetorum* Wh. & N. Aberayron; uncommon in the neighbourhood, I believe. — *R. corylifolius* Sm.

was seen occasionally, but never quite typical; *R. cæsius* appears to be absent.

Potentilla procumbens × *silvestris*.* Roadside near Bethania, with the parents.

Agrimonia odorata Miller.* Llanerch-Aeron; *A. Eupatoria* is very common.

Rosa tomentosa L.*; *R. micrantha* Sm. Between Aberayron and Newquay; both seem to be quite scarce.

Sedum Telephium L. var. *Fabaria* H. C. Wats.* Rocky cliffs, Newquay; rocky banks of the Afon Drowy stream, near its mouth.

Callitriche hamulata Kuetz.* Streamlet between Llanina and Llanarth.

Epilobium angustifolium L.* Monachty Dingle. — *E. obscurum* Schreb.* Frequent.

Smyrnium Olusatrum L. Coast, Newquay; probably introduced, as also may be *Fœniculum vulgare* Miller.*

Carum verticillatum Koch. Damp ground between Aberayron and Llanerch-Aeron; very local.

Anthriscus sylvestris Hoffm.*; *Chærophyllum temulum* L.* Frequent.

Crithmum maritimum L. Cliffs at Newquay, and about half-way between that place and Aberayron; very scarce.

Valerianella dentata Poll. Near Pennant; only one plant seen.

Dipsacus sylvestris Huds.* Near Llanerch-Aeron.

Inula Helenium L. By a streamlet near Henfynyw Church; close to a farmhouse, and doubtless a relic of ancient cultivation. The abundance of *Pulicaria dysenterica* L. along this coast is very striking.

Bidens tripartita L. Ditch-side, Llanerch-Aeron.

Anthemis nobilis L.* In the above-mentioned locality for *Carum verticillatum*.

Matricaria inodora L. var. *salina* Bab. Plentiful and well-marked on the cliffs.

[*Tanacetum vulgare* L. Only in roadside hedges and waste ground near cottages.]

Petasites officinalis Moench.* Llanrhystyd.

Carduus crispus L. Very scarce, on the outskirts of Aberayron; perhaps introduced.

Serratula tinctoria L. In several places between Aberayron and Lampeter; but not plentiful.

Hieracium vulgatum Fr. var. *amplifolium* A. Ley? Shaded roadside banks near Llanerch-Aeron; agrees well with the description in Journ. Bot. 1900, pp. 6–7. — *H. boreale* Fr. var. *Herrieri* Arvet-Touvet. Sandstone cliffs, Newquay, in small quantity; Mr. Linton considers it to be correctly named. I did not see this species anywhere else. — *H. umbellatum* L. var. *coronopifolium* (Bernh.).* Sparingly between Aberarth and Pennant. A well-marked variety, which is either *curtum* Linton or *monticola* (Jordan), grows pretty freely by the Afon Drowy stream, near its plunge into the sea.

Sonchus arvensis L. var. *glabrescens* Hall. Hedge between Aber-

ayron and Henfynyw; the name is by no means descriptive of this perfectly smooth plant.

Schollera Oxycoccus Roth. Bogs east of Cross Inn, and close to Llyn Fanod; I was informed that the Cranberry is common on these upland heaths.

Lysimachia vulgaris L.* Llanerch-Aeron; rare in the district. *L. nemorum* L. is common in damp woods.

Centunculus minimus L. Llanbadarn-Trefeglwys, with *Radiola*.

Erythræa Centaurium Pers. var. *capitata* Koch. Very fine on the coast half-way from Newquay to Aberayron.

Myosotis cæspitosa F. Schultz.* Bethania, &c. — *M. repens* G. Don occurs near Llyn Fanod.

Linaria Elatina Miller. Near Llanerch-Aeron.

Veronica montana L.* Hengeraint Woods. — *V. scutellata* L.* Shore of Llyn Fanod.

Euphrasia Rostkoviana Hayne.* In several places between Aberarth and Pennant. — *E. occidentalis* Wettst.* Heaths about Aberarth, Pennant, and Cross Inn. I referred it doubtfully to *E. brevipila*, when fresh; but the habit is different, and the clothing of the leaves is much more densely hispid. Determined by Prof. Wettstein; but a very different-looking plant from my Cornish and Dorset specimens. I had thought it to be *E. campestris* Jord., after comparison with the figures and description in Wettst. Mon. — *E. curta* Fr. var. *glabrescens* Wettst.* Common. Coast near Newquay; Llanerch-Aeron; abundant and rather polymorphic on the heaths about Aberarth, Pennant, and Cross Inn. I had referred one gathering to *E. nemorosa*, which it approaches very closely, and another to *E. borealis*; but Prof. Wettstein names them all as above. The heath-land plants were mostly quite characteristic.

Bartsia Odontites Huds. Not uncommon: always, I think, the *B. verna* of Reichenbach.

Orobanche major L. Between Llanina and Llanarth, on *Ulex europæus*.

Mentha rotundifolia L.* Coast below Henfynyw, where a streamlet descends to the sea.—*M. gentilis* L.* A form or variety, with the leaves somewhat hairy on both sides, grows in several spots by the river-side between Aberayron and Llanerch-Aeron, looking as much like a true native as does *M. arvensis*, with which it is associated. Mr. Bennett writes:—"Very near *M. resinosa* Opiz in *Naturalientausch*, 10, p. 196. No. 104 (1825), *ex* Déséglise in *Menthæ Opiziamæ* (1881). *M. gentilis* M. Tausch, *M. rubra* C. Hemming (*teste l. c.*). The only seeming real difference is that your specimens are hairy on the upper surface of the leaves. 'Differt a *M. gentili* L. foliis supra glabris et utrinque pilis subhirsutis,' Opiz, *l. c.* Of course simply a variety of *gentilis* L., if that." — *M. arvensis* × *hirsuta*. Roadside between Pennant and Cross Inn. Mr. Linton would refer it to *M. sativa* var. *paludosa*.

Galeopsis versicolor Curt. Rather common in fields at Bethania.

Littorella juncea Berg. Llyn Fanod.

Atriplex hastata L.* Aberayron.

Rumex sanguineus L. var. *viridis* (Sibth.).* Between Llanerch-Aeron and Ciliau-Aeron; no doubt seen elsewhere, but not remembered.

Ulmus montana Stokes. Frequent, and very likely a true native, in the woods near Aberayron.

Betula pubescens Ehrh.* Moors between Aberarth and Bethania.

Empetrum nigrum L. Heaths near Cross Inn.

Listera ovata R. Br.* Between Llanerch-Aeron and Ciliau-Aeron; Monachty Dingle.—*Epipactis latifolia* L. is fairly common and quite typical.

Habenaria viridis R. Br.* Grassy slope, Henfynyw; in considerable quantity.—*H. bifolia* R. Br.* Moorland above Aberarth; between Llanarth and Aberayron.

Sparganium neglectum Beeby. Swamp, Llanerch-Aeron.—*S. ramosum* was not observed.

Arum maculatum L.* Hedgebanks, &c.; common.

Potamogeton pusillus L. var.? Muddy moorland pool above Aberarth; a very slender plant, which I thought, when collecting it, to be *P. trichoides*. It seems, indeed, to be a departure from type in that direction; but Mr. Bennett to some extent reserves his judgment for the present.

Eriophorum vaginatum L. Wet heath near Cross Inn; without personal authority in *Topographical Botany*.

Carex curta Good.* Swamp about half a mile short of Llyn Fanod, coming from Bethania.—*C. paniculata* L.* occurred plentifully in another swamp, not far away.—*C. pilulifera* L.* Common on the upland moors. — *C. pendula* Huds.* Monachty Dingle, sparingly. — *C. lævigata* Sm.* Hengeraint Woods; in damp, clayey hollows.—*C. rostrata* Stokes.* Swamps near Llyn Fanod.

Avena strigosa Schreb. This is cultivated at Bethania (I saw several fields full of it), and occurs there frequently among the other crops, sometimes associated with *A. fatua* L.

Glyceria declinata Brébisson (*G. plicata* var. *depauperata* Crépin).* Near Aberayron, and in several places between Bethania and Llyn Fanod.—*G. distans* L.* Coast a little north-east of Aberayron.

Festuca sciuroides Roth.* Newquay.

Bromus giganteus L. Woods between Aberayron and Ciliau-Aeron; frequent.— *B. sterilis* L.* Aberayron; coast, Newquay.—*B. commutatus* Schrad.* Between Aberayron and Llanerch-Aeron.

Pheyopteris Dryopteris Fée. Monachty Dingle.

Equisetum palustre L.* Damp slopes on the coast near Newquay, towards Aberayron. No *Characeæ* were met with.

THE EUROPEAN SPHAGNACEÆ

(AFTER WARNSTORF)

By E. CHARLES HORRELL, F.L.S.

(Continued from p. 224.)

9. S. QUINQUEFARIUM Warnst. *Hedwigia*, 1885, pp. 222 et seqq.

Syn. *S. acutifolium* var. *quinquefarium* Braithw. *The Sphagnaceæ* (1880).

Plants slender and delicate as *S. Warnstorfii*, or strong and robust as *S. Russowii*, in looser or denser, taller or shorter tufts; pale, grey- to grass-green, or in the upper part a beautiful rose- or violet-red.

Wood-cylinder pale or straw-yellow, never red; cells nodulose.

Stem-cortex in 3–4 layers, cells of median width and thin-walled. Outer wall of the superficial layer with very scattered membrane-thinnings, which frequently also, however, become converted into non-bordered pores; inner cells non-porose. Stem-leaves from a broader base deltoid, not lingulate, apex often suddenly contracted, truncate and toothed, and with inrolled margin; border much widened below, formed of very narrow, greenish, nodulose cells. Hyaline cells in the whole middle part of the leaf wide, in the npper part almost rhombic, in the lower part rhomboid, generally one to several times divided by oblique cross-walls, and with plicæ on the walls; more frequently without than with fibrils and pores in the upper part of the leaf; auricles small.

Fascicles generally with five branches, of which the three stronger are spreading in very various directions; these are sometimes long, becoming very thin towards the apex, sometimes shorter and more shortly acuminate; 5-angled through the 5-rowed arrangement of the leaves; retort-cells of the cortex with but little recurved neck, which has a single large pore at the apex. Branch-leaves closely or loosely imbricate, never secund, small, ovate-lanceolate, inrolled at the generally rounded-truncate and toothed apex; border of 2–3 rows of narrower cells. Pores on the inner surface of the leaf very small, scattered, bordered, and chiefly in the upper and lower cell-angles; pores in the broader part of the leaf and near the margins as far as the base, large and generally non-bordered. On the outer surface from the apex to the base with numerous pores along the commissures; the pores towards the apex are strongly ringed, much larger than in *S. Warnstorfii*, and not circular, but semicircular, and gradually become larger towards the base of the leaf; near the lateral margins the pores on the two surfaces are to some extent immediately opposite each other, producing complete perforation of the leaf. Leaves in the middle above the base with a longitudinal fold; hyaline cells with plicæ on their surfaces.

Chlorophyllose cells in section triangular to trapezoid, inserted between the hyaline cells on the inner surface of the leaf, and here always free; on the outer surface either enclosed by the more

strongly convex hyaline cells or free; lumen large, triangular, wall equally thickened all round.

Generally monoicous, more rarely dioicous; male branches short, in the antheridium-bearing part clavate and always red or violet, later becoming elongate and thinner at the apex; perigonial bracts similar in outline and cell-structure to the other branch-leaves, but non-fibrillose and non-porose in the lower half. Perichætial bracts large, ovate, produced above into a longer or shorter apex with inrolled margin; border wide; in the lower half composed of long, rectangular, nodulose chlorophyllose cells only, in the upper half of both kinds of cells; hyaline cells rhombic to rhomboid, once or several times divided. Fruit very rare; spores yellow, quite smooth, 21–25 μ in diameter.

Hab. Most frequent in mountainous regions, rare in the lowlands.

Distrib. Common in Northern and Western Europe and North America.

Of *S. quinquefarium* Warnstorf remarks that the longer it is studied, the more does one become convinced that it constitutes a distinct species in the *Acutifolium* group, being distinguished from it nearest ally, *S. acutifolium*, by as many and as distinct characters as are any other two species of the section. The wood-cylinder of the stem is either whitish, greenish, or straw-coloured, and never red, only in the rarest cases can a faint tinge of red be seen. The superficial cortical layer of the stem has either large scattered membrane-thinnings or pores; these are sometimes, however, so few in number and so scattered as to be only made out with difficulty and after staining, but are never altogether absent. The stem-leaves resemble those of *S. acutifolium* most nearly, forming an isosceles triangle, with truncate and toothed apex, with inrolled margin, and with the border widened below; the hyaline cells are not once divided, as is generally the case in *S. acutifolium*, but are in most cases several times septate, and are more frequently without than with fibrils and pores in the upper part. The stem-leaves are relatively broader and shorter than in *S. acutifolium*. On the inner surface of the branch-leaves in the apical part there are only small strongly-ringed pores, especially in the upper and lower cell-angles, as in *S. subnitens;* on the outer surface the pores are generally arranged along the commissures, and become gradually larger from the apex to the base, whilst the ring surrounding them becomes gradually less marked. The branch-leaves, when dry, have almost always a slight metallic lustre, and are either imbricate or erecto-patent; in the latter case closely resembling forms of *S. Warnstorfii*, which is, however, readily distinguished by the very small, round, strongly-ringed pores on the outer surface in the upper half of the branch-leaves, and by the lingulate stem-leaves. The distinctly five-rowed arrangement of the leaves, however, generally clearly distinguishes this species, even under the lens, without having recourse to the microscope.

The varieties are based upon the colour, and the forms upon the direction of the branches.

(1) Var. *fusco-flavum* Warnst. in Europ. Torfm. series ii. No. 161 (1890). Colour a mixture of brown and yellow, without any admixture of green.

Cwm Bychan, Merioneth (*Ley*).

(2) Var. *pallescens* Warnst. *l. c.* series i. No. 69 (1888). (Syn. var. *pallens* Warnst. in Hedwigia, 1884, sub *S. acutifolio*.) Tufts either whitish throughout or pale greenish, with at times in the upper part a yellowish or reddish tinge.

Widdy Bank Fell, Teesdale, Durham (*Horrell*); Wastdale Scale, Cumberland (*Ley*); Llanthony Valley, Brecon (*Ley*); Maentwrog, Merioneth (*Horrell*).

(3) Var. *pallido-viride* Warnst. *l. c.* ser. iii. No. 386 (1892). Tufts greyish-green or pale green; in part whitish.

Ebfleet, Surrey (*Horrell*).

(4) Var. *roseum* Warnst. in Bot. Ver. der Prov. Brandenb. xxx. 1888, 112. Tufts in the upper part, and especially in the capitulum, lighter or darker red or violet-red; the remainder greenish or whitish.

(5) Var. *virescens* Warnst. in Europ. Torfm. ser. i. No. 68 (1888). (Syn. var. *viride* Warnst. in Bot. Ver. der Prov. Brandenb. xxx. 1888, 112.) Plants green or greyish-green in the upper part, with scarcely any trace of red; generally whitish below.

Widdy Bank Fell, Teesdale, Durham (*Horrell*); Cwm Rhaidr Valley, Cardigan (*Ley*); Tyn-y-Groes, Dolgelly, Merioneth (*Parsons*).

10. S. SUBNITENS Russ. & Warnst.

Syn. *S. acutifolium* var. *plumosum* Milde; var. *luridum* Hüben.?; var. *læte-virens* Braithw.; var. *flavicomans* Card.

Exsicc. Braithwaite, Sphagn. Exs. Brit. Nos. 31, 32, 33, 38, 40, 41.

One of the most robust species in the *Acutifolium* group.

Plants when dry very soft and with a more or less distinct metallic lustre. Colour very various; grey- or grass-green, pale yellowish green, yellow-brown, violet- to purple-red, not rarely indefinite dirty green and violet.

Wood-cylinder greenish, whitish, or violet- to dark purple-red.

Stem-cortex in 3–4 layers, on one side of the stem generally much more highly developed, and formed of very wide cells; all the cells thin-walled; the superficial cells rarely with pores here and there, inner cells always with small pores.

Stem-leaves large, elongated, isosceles-triangular, from a wide base often suddenly produced above into a longer or shorter, broadly truncate, toothed apex with the margin inrolled; in the middle of the leaf frequently having the margin undulate; border broad, much widened below, and formed of very narrow pitted cells. Hyaline cells in the middle of the leaf above the base wide and large; above rather shorter, rhomboid; near the lateral margins narrower; generally non-fibrillose and without pores, rarely with rudimentary fibrils and pores in the upper part of the leaf; all the hyaline cells 2–6 times septate, and with delicate plicæ on their walls; the apex itself at times formed of small vermicular chlorophyllose cells only.

Fascicles of 3–4 branches, of which the two stronger are spreading, and are very variously directed; the 1–2 pendent branches appressed to the stem.

Branch-leaves of the spreading branches smaller or larger, closely or loosely imbricate, frequently curved, erecto-patent, more rarely somewhat secund or squarrose, never distinctly 5-ranked; from an ovate base produced into a rather long, toothed, flat or rounded truncate apex, with the margin inrolled; border 3–5 cells wide; in the middle of the leaf above the base with a longitudinal fold. Hyaline cells with numerous fibrils; pores on the inner surface almost exclusively near the lateral margins, large, round, generally quite without a border, and situated in the middle of the cell-wall; in the apex of the leaf with small scattered pores in the upper and lower cell-angles; pores on the outer surface much more numerous, in the upper two-thirds to three-fourths of the leaf large, bordered, semi-elliptical, and arranged on the commissures; near the margins some of them are immediately opposite the pores on the inner surface, so that complete perforation of the leaf results; above the leaf-base the pores are very large and non-bordered, situated between the fibrils in the middle of the cell-wall. Leaves of the pendent branches on the inner surface in the upper three-fourths with large, round, generally non-bordered pores in the middle of the cell-wall or in the angles, on the outer surface as in the other leaves.

Chlorophyllose cells in section isosceles-triangular to isosceles-trapezoid (in apex always the latter), inserted between the hyaline cells on the inner surface of the leaf, and here always free; on the outer surface enclosed or free; hyaline cells convex on both surfaces, but more so on the outer.

Generally monoicous, more rarely dioicous; male branches in the antheridium-bearing part reddish-violet, when young short and thick, later having the apex elongated and thinner; perigonial bracts not different from the other leaves in form and anatomical structure, only above the base either non-fibrillose and non-porose, or with rudimentary delicate fibrils. Leaves of the fruiting branches large, ovate, with a very broad border on the upper margins, and crenulate on the rounded truncate apex; below composed of long rectangular pitted chlorophyllose cells only, at the middle part of the leaf of both kinds of cells, and at the apex of small chlorophyllose cells only. Spores yellow, papillose, 25–31 μ in diameter. Fruit very frequent.

S. subnitens is a very characteristic species, and can generally be readily recognized with the lens alone. It is distinguished from *S. acutifolium* especially by the peculiar metallic lustre of the branch-leaves, and by the generally non-fibrillose stem-leaves produced into a longer or shorter apex, and by the several times septate hyaline cells. From large and robust forms of *S. quinquefarium* it is distinguished by the more longly acuminate branch-leaves, never arranged in five rows, and by the different form of the stem-leaves. Incompletely developed forms may be mistaken for *S. molle*, but that species may always be recognized by the denticulate margin of the upper part of the branch-leaves.

Hab. *S. subnitens* is very widely distributed, and is found both in the mountains, on moors, and on the plains. It prefers bogs and very wet and shady places.

Distrib. Common throughout almost the whole of Europe; North America; Asia; Africa.

It would appear to be much the commonest member of the *Acutifolium* group in Britain.

The numerous varieties are based upon the colour of the tufts, and the forms upon the length and direction of the spreading branches and the greater or less robustness of the plants.

(1) Var. *carneum* Russ. apud Warnstorf, Europ. Torfm. ser. iii. No. 245 (1892). Tufts of a pale flesh-colour throughout.

(2) Var. *flavescens* Warnst. Tufts generally yellowish or yellowish-brown, with more or less admixture of green.

Penzance, Cornwall (*Ley*); St. Mary's, Scilly (*Ley*); Whixall Moss, Salop (*Ley*); Ennerdale Lake, Cumberland (*Ley*).

(3) Var. *flavicomans* Card. in Rev. bryol. 1884, 55 (sub *S. acutifolio*). Plants very robust, in loose or dense rather deep tufts, yellowish-brown, resembling *S. fuscum* in colour. Wood-cylinder blood-red; superficial cortical cells with single pores; stem-leaves non-fibrillose, or with fibrils in the upper part only. Branch-leaves large, longish-ovate, apex broadly truncate and dentate, shining when dry.

(4) Var. *flavo-rubellum* Warnst. in litt. Colour a mixture of rose-red and yellowish, sometimes the red predominating, sometimes the yellow.

Lyndhurst, New Forest, Hants (*Ley*); Trelleck Bog, Monmouth (*Ley*); Dungeon Ghyll, Westmoreland (*Paul*); Rhos Goch, Radnor (*Ley*); Borth Bog, Cardigan (*Ley*).

(5) Var. *griseum* Warnst. in Bot. Ver. der Prov. Brandenb. xxx. 1888, 118. Tufts of a uniform greyish-green throughout.

Roseberry Topping, N.E. Yorkshire (*Horrell*).

(6) Var. *obscurum* Warnst. in Bot. Gaz. xv. 1890, 196. Plants very robust, in tall loose tufts. Colour above a mixture of greyish-green and pale dirty brown; below brownish. General colour a dusky indefinite brownish-green.

(7) Var, *pallescens* Warnst. in Europ. Torfm. ser. ii. No. 165 (1890). (Syn. var. *pallens* Warnst.) Colour pale green above, whitish below.

Gallow's Hill, Cromarty (*Ogilvie-Grant*).

(8) Var. *purpurascens* Schlieph. apud Warnst. in Bot. Ver. der Prov. Brandenb. xxx. 1888, 118. Colour purplish throughout.

Nant Pedor, Carmarthenshire (*Ley*); Cwm Idwal, Carnarvonshire (*Horrell*).

(9) Var. *versicolor* Warnst. *l. c.* Colour a mixture of red and green, sometimes the one predominating, sometimes the other.

Widdy Bank Fell, Teesdale, Durham (*Horrell*); Goathland, N.E. Yorkshire (*Horrell*).

(10) Var. *violascens* Warnst. in litt. Colour a lighter or darker violet, sometimes uniform throughout, sometimes only violet in the upper part, and grey or green below.

Budleigh Salterton, Devon (*Ley*); Trelleck Bog, Monmouth (*Ley*); Holt, E. Norfolk (*Burrell*); Nant Pedor, Carmarthenshire (*Ley*); Islay (*Gilmour*).

(11) Var. *virescens* Warnst. in litt. (Syn. var. *viride* Warnst.?) Plant pale or grass-green throughout, or in the upper part only, and whitish below; with no admixture of red.

Pirbright Common, Surrey (*Sherrin*).

11. S. MOLLE Sulliv. Musc. Allegh. p. 50, No. 205 (1846).

Syn. *S. Müllerí* Schimp. Entw. Gesch. d. Torfm. p. 73 (1858).

Exsicc. Braithwaite, Sphagn. Exsicc. Brit. No. 21 (exlc. spec. infer. ad sinistr.) et No. 21c.

In dense and short or looser and taller tufts. Plants in the upper part generally pale- or greyish-green, more rarely tinged with pale-violet. Resembling in habit in most cases small forms of *S. subnitens*.

Wood-cylinder always yellowish or whitish.

Stem-cortex irregularly 2–4-layered; cells of medium width, thin-walled; the outer walls non-porose, inner walls with scattered pits and small pores.

Stem-leaves from a narrower base, distinctly widened to the middle, and then narrowed to a short, widely truncate and coarsely toothed apex; margins of the leaf with narrow border, which is not—or, especially in non-fibrillose leaves, but little—widened below. Hyaline cells once or several times divided by oblique cross-walls, and on the same stem either quite without fibrils and pores, or in the upper half of the leaf or even lower with fibrils and pores; pores on the inner surface of the leaf in the apical part remarkably large, round or roundish-elliptical, generally as wide as the cell, and situated between the fibrils; on the outer surface like those on the branch-leaves.

Auricles large, fibrose and porose.

Fascicles generally near together, more rarely distant, with 3–4 branches; the one or two stronger spreading branches are variously directed, and are very thin at the apex; leaves loosely arranged or almost squarrose. Branch-leaves rather large, resembling the stem-leaves, ovate-lanceolate, not bordered or with a narrow border of 1–2 cells. In the lower half of the leaf, on the outermost marginal cells, in most cases, with membrane-gaps; and in the upper half with distant, small, prominent teeth, as in *S. cymbifolium*. Margin widely inrolled and coarsely toothed on the broadly rounded or truncate apex. Hyaline cells wide, elongate-rhomboid, with numerous spiral fibrils; on the inner surface in the upper part of the leaf frequently with small pores in the upper and lower cell-angles only; more rarely here with scattered large pores in the lateral angles of the cells also, or in the middle of the cell-wall, but in greater number near the lateral margins of the leaf; on the outer surface in the upper and middle part of the leaf with very small, rather strongly ringed pores on the commissures; these become gradually larger and semicircular towards the base; certain of the pores in the cells immediately above the leaf-base are circular

and very large, and are situated in the upper cell-angles or in the middle of the wall.

Chlorophyllose cells in section isosceles-triangular to parallel-trapezoid, inserted between the hyaline cells on the inner surface of the leaf, and here always free; on the outer surface enclosed by the more strongly convex hyaline cells, or, especially towards the leaf apex, free on both sides. The marginal cells in a section through the basal half of the leaf frequently have half-moon-shaped cavities on the edge, showing that the cell-membrane has been in part re-absorbed.

Monoicous; male branches not differing from the others; when young shortly-ovate, later elongated, always pale-violet; perigonial bracts similar to the leaves of the sterile branches. Fruiting branches frequently much elongated; their leaves large, ovate, produced into a longer or shorter, broadly-truncate, irregularly and coarsely toothed apex with inrolled margin; border either narrow throughout or wider at the base and towards the apex (of 5–8 rows of cells); in the lower half of the leaf composed only of elongated, rectangular, or rhomboid pitted chlorophyllose cells; above of both kinds of cells; in the apex itself generally with only shorter, narrower curious green cells. Hyaline cells slightly sigmoid, and usually non-fibrillose and non-porose, more rarely with rudimentary fibrils above. Auricles large, several times divided, with pores and generally also with fibrils. Spores yellow-brown, smooth, 31–35 μ in diameter. Fruiting very frequently.

Hab. On moors, &c., generally in company with *S. rigidum* and *S. molluscum*.

Distrib. Germany, Scandinavia, Denmark, Holland, Belgium, France, North America, South America.

S. molle varies but little, the main varieties depending upon the nature of the habitat.

(1) Var. *pulchellum* Warnst. in Flora, 1884, 603. Tufts tall, (10–15 cm. high) and loose, branches distant; growing in wet localities.

(2) Var. *squarrosulum* Grav. apud Warnst. *l. c.* Leaves more or less squarrose.

(3) Var. *tenerum* Braithw. The Sphagn. 1880, 55. Tufts short (2–4 cm. high) and compact, branches closely arranged; growing in dry habitats.

Dalfroo Bog, Kincardine (*Sim*).

(To be continued.)

MOSSES OF DURHAM

(V.-C. 66, comprising Upper Teesdale and Upper Weardale).

By Wm. Ingham, B.A.

The Mosses in this list were gathered during three visits to Teesdale in 1896, 1897, and 1899, and one visit to Weardale in 1898. In Teesdale I examined (1) the vast amphitheatre of basaltic cliffs about the High Force, with the wood adjoining; (2) the grand range of basaltic cliffs abutting upon the Tees, and known as Falcon Clints; (3) the vast moorland of Widdy Bank Fell; (4) Langdon Beck.

In Weardale I traced to their sources streams which, united, make the River Wear at Wearhead. These streams are Burnhope Burn, Sedling Burn, Kilhope Burn, Welhope Burn, and Ireshope Burn, the last cutting through a bed of mountain limestone, and having the Ireshope Clints of limestone abutting upon the stream.

All the mosses in this list, and in all subsequent lists, have been very carefully examined, and all presenting the slightest uncertainty have passed through Mr. Dixon's hands, and a few, in addition, through Dr. Braithwaite's. I am very much indebted to Mr. Dixon for his kindness, and I wish to thank Dr. Braithwaite for his help.

Sphagnum cymbifolium Ehrh. Burnhope Burn.—*S. tenellum* Ehrh., *c. fr.* Widdy Bank.—*S. subsecundum* Nees. Langdon Beck. —*S. squarrosum* Pers. Burnhope Seat.—*S. acutifolium* Ehrh. Burnhope Burn, Widdy Bank.—Var. *arctum* Braithw. Widdy Bank.—Var. *luridum* Husb. Langdon Beck.—Var. *fuscum* Schimp. Widdy Bank and Burnhope Moor.—Var. *purpureum* Schimp. Widdy Bank.—Var. *quinquefarium* Lindb. Widdy Bank.—Var. *gracile* Russ. Burnhope Seat.—*S. intermedium* Hoffm. Burnhope Moor.—*S. cuspidatum* Ehrh. Widdy Bank; a floating form with extremely short branches.—Var. *plumosum* N. & H. Langdon Beck. —Var. *plumosum* and var. *serrulatum* Schlieph. Burnhope Moor.

Andreæa petrophila Ehrh. Falcon Clints, Cauldron Snout.—Var. *acuminata* Schimp. Falcon Clints.—*A. Rothii* W. & M. Falcon Clints.—Var. *falcata* Lindb. Falcon Clints.—*A. crassinervia* Bruch. Falcon Clints.

Polytrichum alpinum L. Kilhope Burn.—*P. formosum* Hedw. Burnhope Burn and Kilhope Burn.

Ditrichum flexicaule Hampe. Widdy Bank, Kilhope Burn, Ireshope Burn, Langdon Beck, Burnhope Burn; a moss widely distributed in this region.

Swartzia montana Lindb. Burnhope Burn.

Seligeria Doniana C.M. Ireshope Clints.—*S. pusilla* B. & S. Ireshope Clints.

Ceratodon purpureus Brid. Burnhope Burn; very widely distributed.—*C. conicus* Lindb., *c. fr.* High Force.

Rhabdoweisia denticulata B. & S. Falcon Clints.

Cynodontium Bruntoni B. & S. High Force.

Dichodontium pellucidum Schimp. Burnhope Burn, Cauldron Snout, forma.—Var. *fagimontanum* Schimp. Burnhope Burn.—*V. compactum* Schimp. Burnhope Burn.—*D. flavescens* Lindb. Ireshope Burn.

Dicranella heteromalla Schimp. High Force, Widdy Bank, Burnhope Burn.—Var. *sericea* Schimp., *c. fr.* Foot of Widdy Bank, confirmed by Dr. Braithwaite and Mr. Dixon.—*D. secunda* Lindb. Falcon Clints.—*D. varia* Schimp. Widdy Bank, Langdon Beck, Wearhead; widely distributed.—Var. *tenella* Schimp. Wearhead; possibly this var. according to Braithwaite and Dixon.—*D. squarrosa* Schimp. Falcon Clints, Wearhead, Burnhope Burn.

Blindia acuta B. & S. Falcon Clints.—Var. *trichodes* Braithw. In leaf form; Cauldron Snout.

Campylopus flexuosus Brid. Burnhope Seat. Cauldron Snout (dwarf form), Widdy Bank (a very large form).—*C. atrovirens* De Not. Widdy Bank.

Dicranum Bonjeani De Not. Burnhope Burn, Widdy Bank, *c. fr.*, Wearhead; very widely distributed.—*D. scoparium* Hedw. Langdon Beck, Falcon Clints.

Fissidens viridulus Wahlenb. Ireshope Burn.—*F. osmundoides* Hedw. Burnhope Burn.—*F. adiantoides* Hedw. Widdy Bank, *c. fr.*, Burnhope Burn, Ireshope Burn (large growth).

Grimmia apocarpa Hedw. Widdy Bank, Langdon Beck, Ireshope Burn, Wearhead.—Var. *gracilis* W. & M. Widdy Bank, High Force.—*G. funalis* Schimp. Widdy Bank, Cauldron Snout.—*G. torquata* Hornsch. Falcon Clints.

Rhacomitrium aciculare Brid. Langdon Beck, Burnhope Burn, Cauldron Snout.—Var. *denticulata* B. & S. Cauldron Snout; a pale green form.—*R. protensum* Widdy Bank.—*R. heterostichum* Brid. Widdy Bank, High Force.—*R. lanuginosum* Brid. Burnhope Burn.—*R. canescens* Brid. Widdy Bank, Wearhead, Langdon Beck. Var. *ericoides* B. & S. Langdon Beck.

Tortula subulata Hedw. Burnhope, Ireshope, Cowshill, High Force, Langdon Beck; very abundant and widely distributed.—*T. ruralis* Ehrh. High Force, Cowshill.

Barbula rubella Mitt. Langdon Beck, Ireshope.—Var. *dentata* Braithw. Ireshope Clints.—Var. *ruberrima* Braithw. Cauldron Snout, Widdy Bank.—*B. fallax* Hedw. High Force.—Var. *brevifolia* Schultz. Langdon Beck.—*B. recurvifolia* Schimp. Wearhead, Langdon Beck.—*B. spadicea* Mill. Langdon Beck, Ireshope Burn.—*B. rigidula* Mill. Widdy Bank, Ireshope Burn, Wearhead, Langdon Beck, Burnhope.—*B. cylindrica* Schimp. Langdon Beck, Burnhope Burn.—*B. revoluta* Brid. Cauldron Snout; in abundant fruit; Burnhope Burn.—*B. convoluta* Hedw. High Force.

Weisia viridula Hedw. Wearhead.—*W. crispata* C. M. Killhope Burn.—*W. rupestris* C. M. High Force, Langdon Beck, Falcon Clints, Wearhead, Ireshope Burn; a widely distributed moss.—Var. *intermedia* Jack. A remarkable and pretty form; Ireshope Clints.—Var. *stelligera*. In abundant fruit; Falcon Clints.—Var. *compactum* Schimp. High Force.—Var. *rigidum* Schimp. High Force.—Var. *affinis* Ingham. A new and good var. according to Dr. Braithwaite, Mr. Dixon,

and Mr. Bagnall. It has the areolation of *W. rupestris*, but the habit, pale colour, and systylious lid of *W. curvirostris*. The capsule is leptodermous, and without the long subulate oblique beak of *W. curvirostris*. Found on Falcon Clints, July 26th, 1898. *B. curvirostris* C. M. Widdy Bank, Falcon Clints.—Var. *commutata* Dixon. Widdy Bank.—*W. verticillata* Brid. Ireshope Burn.

Trichostomum tenuirostre Lindb. Cauldron Snout.—*T. tortuosum* Dixon. Widdy Bank, Langdon Beck, Ireshope Burn, Burnhope Burn; very widely distributed.—Var. *fragilifolium* Dixon. Burnhope Burn.

Encalypta ciliata Hoffm. Ireshope Clints.

Zygodon Mougeotii B. & S. Falcon Clints, High Force.

Ulota Bruchii Hornsch. High Force.—*U. crispa* var. *intermedia* Dixon. Cowshill.

Orthotrichum affine Schrad. Cowshill, Langdon Beck, High Force.—*O. Lyellii* H. & T. High Force, Cowshill (very abundant gemmæ on leaves).—*O. cupulatum* Hoffm. Langdon Beck, High Force, Cowshill.—Var. *nudum* Braithw. Langdon Beck.—*O. anomalum* var. *saxatile* Milde. Cowshill, High Force.—*O. stramineum* Hornsch. High Force.—*O. pulchellum* Sm. High Force.

Splachnum sphæricum L., f. Widdy Bank, Wearhead.

Funaria hygrometrica Sibth. Widdy Bank. — *F. ericetorum* Dixon. Cauldron Snout.

Amblyodon dealbatus P. B. Widdy Bank.

Meesia trichoides Spruce. Widdy Bank.

Aulacommium palustre Schwaegr. Widdy Bank.

Catascopium nigritum Brid. Widdy Bank.

Bartramia Œderi Sw. Ireshope Clints.—*B. ithyphylla* Brid. Cauldron Snout, Cowshill.—*B. pomiformis* Hedw. Widdy Bank, Ireshope Clints.

Philonotis fontana Brid. Burnhope Burn, Cowshill (in abundant fruit), Ireshope Burn.—*P. calcarea* Schimp. Widdy Bank, Burnhope Burn (a yellow form).—*P. adpressa* Ferg. *c. fr.* Burnhope Burn.

Breutelia arcuata Schimp. Falcon Clints.

Webera cruda Schwaegr. Ireshope Clints, Cowshill.—*W. albicans* Schimp. Falcon Clints (a very large form), Ireshope Burn (a very delicate, almost filiform form).

Plagiobryum Zierii Lindb. Ireshope Clints, Falcon Clints, High Force.

Bryum filiforme Dicks. Falcon Clints.—*B. inclinatum* Bland. Widdy Bank, High Force.—*B. pendulum* Schimp. High Force.—Var. *compactum* Schimp. Widdy Bank; so named by Dr. Braithwaite.—*B. intermedium* Brid. Widdy Bank, Kilhope Burn.—*B. bimum* Schreb. Wearhead.—*B. pseudo-triquetrum* Schwaegr. Widdy Bank, Wearhead; abundant and freely fruiting.—*B. pallens* Sw. Widdy Bank, Wearhead; very abundant, and copiously fruiting in Weardale.—*B. pallescens* Schleich. Wearhead.—*B. cæspiticium* L. Cowshill; "approaching the var. *imbricatum* B. & S., at least" (H. N. Dixon).—*B. capillare* L. Ireshope Burn, Langdon Beck, High Force. Burnhope Burn; very common.—Near var. *Verchelii*

B. & S. Cowshill.—*B. alpinum* Huds. Cauldron Snout.—*B. mildeanum* Jur. Falcon Clints.

Mnium affine Bland. Ireshope Burn.—Var. *elatum* B. & S. Widdy Bank, Burnhope Burn.—*M. cuspidatum* Hedw. Burnhope Burn.—*M. rostratum* Schrad. Ireshope Burn, *c. fr.*, Kilhope Burn. —*M. serratum* Schrad. High Force, Ireshope Burn.—*M. punctatum* L. Ireshope Burn, Cauldron Snout, Widdy Bank.

Cinclidium stygium Sw. Widdy Bank.

Fontinalis antipyretica L. Widdy Bank.

Neckera complanata Hüb. Langdon Beck.

Antitrichia curtipendula Brid. High Force, Cowshill.

Anomodon viticulosus H. & T. Langdon Beck.

Heterocladium heteropterum B. & S. High Force, Falcon Clints.

Thuidium tamariscinum B. & S. Widdy Bank.

Cylindrothecium concinnum Schimp. Falcon Clints. Burnhope Road.

Orthothecium intricatum B. & S. Falcon Clints, Ireshope Burn and Clints.

Isothecium myurum Brid. High Force, *c. fr.*, Langdon Beck, *c. fr.*, Cowshill.

Camptothecium lutescens B. & S. High Force.

Brachythecium rutabulum B. & S. Cowshill.—*B. rivulare* B. & S. High Force, Ireshope Burn.—Var. *latifolium* Husn. Burnhope Burn.—*B. velutinum* B. & S. Cowshill, Langdon Beck.—*B. populeum* B. & S. Langdon Beck, Cowshill.—*B. plumosum* B. & S. High Force, Widdy Bank.—*B. cæspitosum* Dixon. High Force.

Hyocomium flagellare B. & S. Falcon Clints, Cauldron Snout.

Eurhynchium piliferum B. & S. High Force.—*E. prælongum* B. & S. Burnhope Burn, Ireshope Burn.—*E. Swartzii* Hobk. Ireshope Clints.—*E. pumilum* Schimp. Ireshope Clints.—*E. myosuroides* Schimp. Falcon Clints, Ireshope Clints, Langdon Beck.—*E. striatum* B. & S. High Force.—*E. rusciforme* Milde. Burnhope Burn.—Var. *atlanticum* Brid. Under waterfall, Cowshill.

Plagiothecium pulchellum B. & S. Ireshope Clints.—*P. denticulatum* B. & S. Cowshill, Langdon Beck, Ireshope Clints, High Force; widely distributed.—*P. undulatum* B. & S. Top of Burnhope Seat; a remarkable form with imbricated leaves; Langdon Beck.

Amblystegium Juratzkae Schimp. Cowshill. — *A. filicinum* De Not. Sedling Burn, *c. fr.*, Burnhope Burn, *c. fr.*, Cowshill, High Force, Langdon Beck, Widdy Bank; abundant in both Teesdale and Weardale.—Var. *elatum* Schimp. Sedling Burn; verified by Dr. Braithwaite.—Var. *gracilescens* Schimp. Ireshope Burn.

Hypnum riparium L. Burnhope Burn.—*H. stellatum* Schreb. Widdy Bank.—Var. *protensum* B. & S. Cowshill.—*H. chrysophyllum* Brid. Widdy Bank—Var. *erectum* Bagn. Ireshope Burn. —*H. lycopodioides* Schwaegr. Widdy Bank.—*H. fluitans* var *falcatum* Schimp. In abundant fruit on the top of Burnhope Seat.—Var. *submersum* Schimp. In pool by Ireshope Burn.—*H. exannulatum* Gümb. On the Weardale side of hill overlooking Langdon Beck.—Var. *purpurascens* Schimp. On the Langdon Beck side of the same hill.—*H. uncinatum* Hedw. Burnhope Burn, Ireshope

Burn, Cowshill, High Force. Common and in abundant fruit in both dales.—Var. *plumulosum* Schimp. High Force, *c. fr.*—*H. revolvens* Sw., var. *Cossoni* Ren., *forma falcata* Sanio. Widdy Bank. —*H. commutatum* Hedw. Burnhope Burn. Widdy Bank, High Force, Cowshill; abundant, and copiously fruiting in both dales.—*H. falcatum* Brid. Burnhope Burn, *c. fr.*, Widdy Bank, High Force.—Var. *gracilescens* Schimp. High Force.—*H. cupressiforme* L. Cowshill, Falcon Clints.—Var. *filiforme* Brid. Cowshill.—Var. *resupinatum* Schimp. Langdon Beck.—Var. *tectorum* Brid. Ireshope. —Var. *elatum* B. & S. Burnhope Burn.—*H. molluscum* Hedw. Cowshill, *c. fr.*, Widdy Bank; a form like *H. hamulosum*. —*H. palustre* L. Ireshope Burn, Falcon Clints, Wearhead, Langdon Beck, Cowshill; a very common moss.—Var. *subsphæricarpon* B. & S. High Force, *c. fr.*—*H. ochraceum* Turn. Very abundant in the upper part of Burnhope Burn.—*H. straminenm* Dicks. Burnhope Burn.—*H. giganteum* Schimp. Widdy Bank; a very large and very fine form.—*H. cuspidatum* L. Burnhope Burn; near var. *pungens* Schimp. Burnhope Burn.

Hylocomium splendens B. & S. Widdy Bank, Burnhope Road.—*H. loreum* B. & S. Cowshill.—*H. squarrosum* B. & S. Burnhope Burn.—*H. triquetrum* B. & S. High Force, Burnhope Burn.

NORFOLK NOTES.

By E. F. Linton, M.A.

(Concluded from p. 215.)

Saxifraga granulata L. Thorpe; Rackheath, in plenty. 28. Larlingford.

Parnassia palustris L. Flordon; Cawston; South Repps Common. 28. Thetford, 1835, *hb. Salmon*.

Ribes Grossularia L. Sprowston.

R. rubrum L. By the Bure, above Wroxham; copse, Sprowston, in plenty.

R. nigrum L. Ranworth; Cawston. 28. Thetford, 1836, *hb. Salmon*. Larlingford.

Tillæa muscosa L. Sandy warren near Rushford, to which spot I was directed by the Rev. H. E. Fox.

Sedum Telephium L. Attlebridge; Paston; Mundesley, 28. Gressenhall to East Dereham.

S. album L. 28. Stoke Ferry, 1837, *hb. Salmon*.

S. rupestre L. Banks between Gunton and Trunch, abundant, 1885, &c.; Mundesley to Paston; Geldeston. So widely spread and locally abundant as to claim a place among native plants, if it is not actually native. The form is rather var. *majus* than var. *minus*.

Sempervivum tectorum L. Sprowston. 28. Thetford, 1836, *hb. Salmon*.

Drosera rotundifolia L. Cawston; Sprowston. 28. Breckles Fen, near Wretham, and Stanford Warren, 1836, *hb. Salmon*.

D. anglica Huds. Roydon. near Diss.

Hippuris vulgaris L. Trowse; Ranworth Broad; Ormesby. 23. Abundant in a large pool, Narford.

Myriophyllum verticillatum L. 28. Hilgay, *hb. Salmon*. Larlingford.

Callitriche hamulata Kuetz. Ellingham; Hoveton; Ranworth.

C. obtusangula Le Gall. Yarmouth.

Peplis Portula L. Thorpe; Ormesby; Cley. 28. North Elmham.

Lythrum Salicaria L. Ellingham. 28. Thetford, 1836, *hb. Salmon*.

Epilobium roseum Schreb. 28. By a streamlet running from East Dereham into the stream from Scarning.

E. palustre L. Ellingham. 28. Thetford, *hb. Salmon*. East Dereham.

Œnothera odorata Jacq. Common in a sandy cemetery just north of Yarmouth.

Circæa lutetiana L. Beeston St. Andrew.

Hydrocotyle vulgaris L. Ranworth; Alderford Common. 28. Gressenhall; Lexham.

Eryngium maritimum L. Caister to Ormesby. 28. Holkham.

Sanicula europæa L. Salhouse; Knapton; Cawston to Aylsham.

Conium maculatum L. Geldeston; Reedham; Knapton; Cley. 28. Swaffham.

Smyrnium Olusatrum L. Postwick (? 1835, *hb. Salmon*; note not quite clear). South Heigham; Hemsby; Ormesby; Barton Turf; Cley.

Bupleurum tenuissimum L. Near Yarmouth, *G. R. L. in hb. Salmon*. 28. South Lynn, *B. D. Wardale in hb. Salmon*. East of Wells.

Apium graveolens L. 28. Downham Market, *hb. Salmon*. Wells.

A. inundatum Reich. fil. Sprowston; Alderford Common.

Cicuta virosa L. Ormesby; Ranworth; Barton Broad.

Carum segetum Benth. & Hook. fil. Cley. 28. East of Wells.

Sison Amomum L. Kirby Cane. 28. Yaxham.

Sium latifolium L. Ranworth; Ormesby. 28. Thetford, 1837, *hb. Salmon*.

S. erectum Huds. Ellingham; Flordon; Ormesby; Ranworth. 28. Thetford, 1835, *hb. Salmon*. Beetley; Newton.

Pimpinella Saxifraga L. Well distributed.—Var. *dissecta* With. Frettenham. 28. North Elmham; East Harling.

Scandix Pecten-Veneris L. Knapton; Paston. 28. Thetford, 1836, *hb. Salmon*. Garboldisham; Scarning; Swaffham.

Anthriscus vulgaris Bernh. Locally abundant, as in Sprowston; North Walsham. 28. Thetford, *hb. Salmon* (labelled *Torilis Anthriscus*). Beetley to Gressenhall.

Fœniculum vulgare Mill. Cley.

Œnanthe fluviatilis Coleman. Trowse, in the river.

Silaus flavescens Bernh. Cley. 28. Gressenhall; by the railway, in plenty, Scarning.

Peucedanum palustre Moench. Hoveton Broad.

Caucalis arvensis Huds. Mundesley. 28. Thetford !, *hb. Salmon.* Swaffham; Castleacre.

Cornus sanguinea L. Flordon; Earlham; Wymondham. 28. Newton; Swaffham; Castleacre.

Adoxa Moschatellina L. South Lopham, 1836, *hb. Salmon.*

Galium erectum Huds. North-west side of Thorpe.

G. Mollugo L. Flordon; Ellingham; Wymondham. 28. Castleacre.

G. uliginosum L. Gressenhall.

Asperula cynanchica L. 28. Thetford, 1837, *hb. Salmon.* East Harling.

Valerianella dentata Poll. Field just south of Rackheath Park.

Dipsacus sylvestris L. 28. Larlingford.

Scabiosa Columbaria L. Heigham. 28. Scarning; Swaffham; Southacre.

Solidago Virgaurea L. Strangely infrequent; only seen by me at Gressenhall.

Filago apiculata G. E. Sm. Ellingham to Geldeston, scarce, in company with *F. germanica* L.

F. spathulata Presl. Hellesdon; Wroxham. 28. Beetley.

F. minima L. Mousehold Heath; Cawston; Geldeston. 28. Thetford, *hb. Salmon.* East Harling to Knettishall.

Gnaphalium luteo-album L. 28. "Field at Larlingford, ex herb. Rev. G. R. Leathes," *in hb. Salmon.* Sandy waste near Wells, 1883–86; it was gathered again in 1899.

G. sylvaticum L. Cawston.

Bidens cernua L. var. *radiata* Sond. Postwick, 1884.

B. tripartita L. Kirby Cane.

Chrysanthemum segetum L. Sprowston; Wymondham.

Matricaria Chamomilla L. 28. Swaffham.

Artemisia Absinthium L. Yarmouth towards Caister. 28. Thetford towards Euston, 1835, *hb. Salmon.*

A. maritima L. var. *gallica* (Willd.). East of Wells.

Petasites officinalis Moench. Thorpe.

Senecio vulgaris L., rayed form. Yarmouth.

S. squalidus L. Wall of the churchyard, Yarmouth.

S. erucifolius L. Tivetshall; Crostwick; North Walsham; Knapton. 28. Scarning, frequent.

Carlina vulgaris L. Newton St. Faith's; Cawston. 28. Thetford, *hb. Salmon.* Gressenhall.

Arctium majus Bernh. Sprowston.

Carduus pycnocephalus L. Cromer.

C. nutans L. Ellingham; Hellesdon. 28. Thetford, *hb. Salmon.* North Elmham; Swaffham; Lexham.

C. crispus L. Wymondham; Morton Warren.

C. eriophorus Roth. 28. I believe I saw root-leaves of this on Lexham Heath.

C. acaulis Willd. Between Thorpe and Rackheath Park; Alderford Common. 28. Thetford, *hb. Salmon.* Swaffham.

Onopordon Acanthium L. Sprowston. 28. Larling.

Mariana lactea Hill. Cliff, Cromer.

Centaurea Cyanus L. Sprowston. 28. Thetford, *hb. Salmon.*
C. Calcitrapa L. Downham, 1837, *hb. Salmon.*
C. solstitialis L. 28. Croxton Road, Thetford, 1836, *hb. Salmon.*
Cichorium Intybus L. Sprowston; Geldeston. 28. Larlingford.
Picris hieracioides L. Roadside, Drayton; very local in the county.
P. echinoides L. Very local. 28. Hilgay, *hb. Salmon.*
Crepis taraxacifolia Thuill. Railway bank, Acle; Sprowston.
C. biennis L. Thorpe, towards the north-east corner of Mousehold.
Hieracium sciaphilum Uechtr. Knapton; Swafield to Paston. No *H. vulgatum* Fr. was observed by me.
H. boreale Fr. Newton St. Faith's, 1887; by the Quakers' burying-ground, North Walsham; Sprowston.
H. umbellatum L. Heath, Newton St. Faith's, and towards Horsford; Caister to Ormesby, on the cliff. 28. Wimbotsham, 1838, *hb. Salmon.*
Hypochæris glabra L. 28. Croxton Heath; Thetford to Rushford.
Lactuca virosa L. Cromer; Sprowston. 28. Castleacre.
Tragopogon pratense L. var. *grandiflorum.* Norwich cemetery, perhaps introduced with grass seed.
Jasione montana L. Caister. Swafield to Knapton.
Campanula glomerata L. 28. Stoke Ferry, 1835, *hb. Salmon.*
C. Trachelium L. 28. "Damnable Lane," Stoke Ferry, 1836, *hb. Salmon.*
C. Rapunculus L. On old Buckenham Castle, ex herb. G. R. Leathes, *hb. Salmon.*
Specularia hybrida A. DC. 28. Thetford, 1835, *hb. Salmon.*
Hypopitys Monotropa Crantz. Very fine and in plenty, Westwick Woods. 28. Horton Spinney, Thetford, 1835, *hb. Salmon.*
Statice Limonium L. 28. Hunstanton.
S. auriculæfolia Vahl. 28. Holkham (as well as Wells).
S. reticulata L. Cley, 1809, *hb. Salmon.*
Hottonia palustris L. Ellingham.
Lysimachia vulgaris L. Filby; Ranworth. 28. By the river, Thetford, 1835, *hb. Salmon.*
L. Nummularia L. Ellingham. 28. Thetford, 1835, *hb. Salmon.*
L. nemorum L. Arminghall; Swafield to Knapton.
Anagallis tenella L. Geldeston. 28. Thetford, 1835, *hb. Salmon.*
Centunculus minimus L. Sprowston Common; Cawston (towards Aylsham).
Samolus Valerandi L. Horsford; Ormesby. 28. Breckles Fen and Stanford Warren, 1836, *hb. Salmon.*
Ligustrum vulgare L. Beeston St. Andrew; Swafield. 28. Beetley; Larling; Swaffham; Lexham.
Vinca major L. Arminghall; Bacton. 28. Croxton, claypit, *hb. Salmon.*
Erythræa Centaurium Pers. Cawston; Blickling; South Repps Common. 28. Kilverstone Lane, Thetford, *hb. Salmon.* Scarning; Holkham.

Gentiana Pneumonanthe L. Near Newton St. Faith's; Ormesby Common.

G. campestris L. South Repps Common.

Menyanthes trifoliata L. Flordon. 28. Beetley Common.

Limnanthemum peltatum G. P. Gmel. 28. Welney Delph, abundant, 1837, *hb. Salmon.*

Borago officinalis L. Cley.

Anchusa sempervirens L. 28. Rushford.

Myosotis cæspitosa F. Schultz. North Walsham. 28. Roudham.

M. palustris Relh. Ellingham; Hoveton; North Walsham; Mundesley to Paston. 28. Larlingford; Newton.

M. collina Hoffm. Swafield.—Var. *Mittenii* Baker. Thorpe. 28. Thetford.

Echium vulgare L. Salhouse; Cromer. 28. East Harling.

Convolvulus Soldanella Junger. Ormesby; Caister.

Cuscuta Epithymum Murr. Newton St. Faith's; Cawston; Beeston, near Cromer. 28. Swaffham Heath, 1835, *hb. Salmon.*

C. Trifolii Bab. Sprowston.

Lycium barbarum L. Hedges, &c., Sprowston; Wymondham; Mundesley. 28. Larlingford; Swaffham; Lexham.

Datura Stramonium L. Geldeston, 1889.

Hyoscyamus niger L. 28. Thetford, 1835, *hb. Salmon.*

Verbascum Thapsus L. Ellingham; Flordon; Cawston; Mundesley. 28. North Elmham; Roudham; Larlingford; Swaffham; Southacre.

V. pulverulentum Vill. Rackheath; Sprowston. 28. Newton; Southacre.

V. nigrum L. Ellingham; Alderford Common.

Linaria Cymbalaria L. Cley.

L. Elatina Mill. Sprowston; Newton St. Faith's.

L. spuria Mill. Sprowston.

L. viscida Moench. Geldeston. 28. Northwold, *hb. Salmon.*

Antirrhinum Orontium L. Sprowston; Geldeston; Wymondham. 28. Downham Market, 1838, *hb. Salmon.*

Veronica polita Fr. Sprowston. 28. Thetford, *hb. Salmon.*

V. agrestis L. Sprowston. 28. Lexham.

V. Tournefortii C. Gmel. Abundant, Sprowston; Geldeston; Cromer. 28. Thetford; Swaffham; Castleacre.

V. triphyllos L. Thetford, Norfolk, *hb. Salmon.* (I have only seen it on the Suffolk side of the boundary.)

V. scutellata L. Thorpe; Rackheath.

V. Anagallis L. Ellingham; Wymondham; Alderford; W. of Wroxham; Cley. 28. Larlingford; Newton.

Euphrasia officinalis L. Flordon; Wymondham; Cawston; Bradfield. 28. Newton.—Var. *nemorosa* H. Marten. 28. North-east of Thetford.

Bartsia Odontites Huds.—Var. *verna* (Reichb.). Ellingham. Var. *serotina* (Reichb.). Flordon; Wymondham. 28. Castleacre; Newton.

Pedicularis palustris L. Flordon; South Repps Common. 28. Thetford, *hb. Salmon.* Newton.

Orobanche major L. Geldeston, 1889.

O. minor Sm. Sprowston. 28. Methwold, 1836, *hb. Salmon.* Thetford.

Utricularia vulgaris L. Ellingham. 28. Thetford, 1835, *hb. Salmon.*

U. minor L. 28. Near Thetford, 1836, *hb. Salmon.*

Pinguicula vulgaris L. 28. Stanford Warren, *hb. Salmon.*

Verbena officinalis L. Flordon; Wymondham; Attlebridge; Cawston. 28. Beetley to Gressenhall; Scarning.

Mentha alopecuroides Hull. Outcast, on a roadside bank, Sprowston; Kirby Cane. 28. Larlingford, corner of a field in plenty, perhaps introduced from marshes near.

M. longifolia Huds. South Repps Common.

M. sativa L. Cawston; Sprowston; Bradfield.

Lycopus europæus L. Flordon; Sprowston; Ranworth. 28. Thetford, *hb. Salmon.* Larlingford; Newton.

Thymus Serpyllum Fr. Sprowston.

T. Chamædrys Fr. Sprowston; Thorpe.

Calamintha Clinopodium Spenn. Flordon; Ellingham; Attlebridge. 28. Thetford to Shadwell, *hb. Salmon.* Swaffham.

C. arvensis Lam. Salhouse; Attlebridge; Cawston. 28. Narford; Swaffham; East Harling to Knettishall.

C. officinalis Moench. Ellingham; Horsford; Cawston; Cley.

Nepeta Cataria L. Hellesdon, abundant. 28. Kilverstone Lane, Thetford, *hb. Salmon.* Larlingford.

Scutellaria galericulata L. Flordon; Ellingham; Ranworth; Hoveton.

Marrubium vulgare L. 28. Thetford to Rushford.

Stachys arvensis L. Newton St. Faith's; Tivetshall.

Galeopsis angustifolia Ehrh. Loddon.

G. versicolor Curt. 28. Near West Dereham, *hb. Salmon.*

Lamium amplexicaule L. Sprowston; Cromer.

L. hybridum Vill. Attlebridge; Cawston; Aylsham; Mundesley to Paston. 28. Scarning; North Elmham; Larlingford; Swaffham; Newton.

Teucrium Scordium L. 28. "Abundant by the side of Welney Delph, R. D. Salmon," *hb. Salmon.*

Plantago media L. 28. Swaffham; Larling.

P. Coronopus L. 28. Roudham; Lexham.

Chenopodium polyspermum L. Redenhall.

C. Vulvaria L. 28. Lynn Regis, 1837, *hb. Salmon.*

C. ficifolium Sm. Ormesby.

C. rubrum L. 28. Wells to Holkham, in plenty, 1884.

C. Bonus-Henricus L. Geldeston; Attlebridge; Newton St. Faith's; Blickling; Bacton. 28. Larlingford; Thetford.

Atriplex littoralis L. Cley.

A. angustifolia Sm. Wymondham. 21. Beetley; Swaffham.

A. hastata L. Ellingham. 28. Wells.

Polygonum aviculare L.—Var. *vulgatum* Syme. Ellingham.—Var. *arenastrum* (Bor.). Ellingham; Hellesden.—Var. *rurivagum* (Jord.). Wymondham.

P. Raii Bab. North Dene, Yarmouth.

P. minus Huds. Filby, ex herb. Rev. G. R. Leathes, *hb. Salmon.*

Newton St. Faith's, with *Mentha Pulegium* L.

P. mite Schrank. Newton St. Faith's; Kirby Cane. 28. North Elmham, towards Beetley; Scarning.

P. lapathifolium L. Geldeston; Sprowston; Newton St. Faith's.

P. amphibium L. Ellingham; Cantley; Barton Broad; North Walsham; Swafield (var. *terrestre*). 28. North Elmham; Larlingford; Newton.

Rumex maritimus L. 28. Roudham Mere, and neighbouring pool, abundant; an interesting inland locality.

R. pulcher L. Flordon; Newton St. Faith's. 28. Beetley; Gressenhall to East Dereham; Narford.

R. Hydrolapathum Huds. Ranworth; Barton Broad. 28. Beetley Common; Larlingford; Newton.

Hippophae rhamnoides L. Cliffs, Ormesby to Hemsby, abundant in places.

Viscum album L. 28. On apple, Shipdham, 1837, *hb. Salmon.*

Mecurialis annua L. Thorpe Hamlet.

Parietaria officinalis L. Newton St. Faith's; Barton Turf; Cley. 28. Thetford; Castleacre.

Myrica Gale L. Hoveton; Ranworth.

Carpinus Betulus L. Large tree, Beeston St. Andrew; Loddon; Wymondham. 28. Roudham; Swaffham; Lexham.

Quercus Robur L. Var. *sessiliflora* (Salisb.). Sprowston; apparently very rare.

Salix triandra L. Ellingham; Flordon; Thorpe; by the Dolphin Ferry, Norwich; Aylsham. Subsp. *Hoffmanniana* (Sm.) 28. By the Harling Road Station.

S. undulata Ehrh. Riverside, Thorpe.

S. fragilis L. Flordon; Sprowston; Geldeston; Ranworth &c.; usually the form *britannica*. 28. Beetley.

S. alba L. Flordon; Ellingham; Buckenham; Haddiscoe; east of North Walsham. 28. Beetley Common; Thetford; Newton; Castleacre.

S. purpurea L. Alderford. 28. Thetford.

S. viminalis L. Wymondham.

S. Smithiana aggreg. By the Dolphin Ferry, Norwich; Wroxham. 28. Larling.

S. Caprea L. Beeston St. Andrew; Sprowston; Cawston.

S. aurita L. Newton St. Faith's.

Populus canescens Sm. Hellesdon; Sprowston. 28. Swaffham.

P. tremula L. Thorpe; Sprowston (both var. *glabra* Syme).

P. nigra L. Heigham. 28. Beetley; Swaffham.

Ceratophyllum demersum L. Ranworth Broad.

Hydrocharis Morsus ranæ L. Ellingham; Ranworth and Barton Broads. 28. Thetford, 1835, *hb. Salmon.*

Stratiotes aloides L. Barton Broad. 28. Thetford, *hb. Salmon.*

Spiranthes autumnalis L. Sprowston; Bradfield.

Epipactis palustris Crantz. Ranworth; South Repps Common.

28. Stanford Warren, *hb. Salmon.* Between sandhills, Wells to Holkham.

Orchis pyramidalis L. 28. Narford to Narborough.

O. latifolia L. Ranworth. 28. Thetford, *hb. Salmon.*

O. incarnata L. Roydon. — Var. *angustifolia* (Bab.). Hoveton Broad.

Ophrys apifera Huds. Sprowston; Ormesby.

Habenaria conopsea Benth. South Repps Common. 28. Stanford Warren, *hb. Salmon.*

Tamus communis L. Paston; Swafield to Knapton.

Allium vineale L. Hedgebanks, Sprowston, usually in the form *bulbiferum* Syme. Remarkably rare in the county.

Juncus Gerardi Loisel. Cley. 28. Wells. Mr. Trimmer does not distinguish this from *J. compressus* Jacq.; some of his localities for the latter should no doubt be relegated to the former.

J. diffusus Hoppe. Beeston St. Andrew; Bradfield. 28. East Dereham.

J. maritimus L. 28. Wells to Holkham, in some abundance.

J. acutus L. 28. Wells, "ex herb. G. R. L. comm. D. Turner Esq.," *hb. Salmon.*

J. supinus Moench. Copse near Sprowston Grange; Yarmouth; Alderford Common. 28. Wells; Newton. Not frequent, but scarcely "rare" (*Trimmer*).

J. obtusiflorus Ehrh. The Rev. K. Trimmer again says "rare"; rather it is local. Geldeston; Flordon; Harleston; Beeston St. Andrew; Ormesby; Ranworth; Hoveton; Cawston; South Repps Common; Bradfield.

J. lamprocarpus Ehrh. Flordon; Ellingham; Horsford; Alderford.

J. acutiflorus Ehrh. Flordon; Wymondham; Beeston St. Andrew; Cawston. 28. North Elmham; Newton.

Typha latifolia L. Geldeston; Rackheath; Ranworth; Hoveton; Barton Broad. 28. Near Thetford, *hb. Salmon.*

T. angustifolia L. Hoveton; Wroxham. 28. Near Thetford, *hb. Salmon*

Sparganium ramosum Huds. Ellingham; Yarmouth; Ranworth. 28. Thetford, 1836, *hb. Salmon.* Beetley Common.

S. neglectum Beeby. Only seen at Flordon, a station on previous record.

S. simplex Huds. Ellingham; Hellesdon; Yarmouth. 28. Near Thetford, 1836, *hb. Salmon.*

S. natans L. 28. Wretton Fen, Stoke Ferry, *hb. Salmon;* I have no note to show segregate.

Acorus Calamus L. Reedham, ex herb. G. R. Leathes, *hb. Salmon.* In the river flowing into Barton Broad.

Lemna trisulca L. Ellingham; Sprowston; Flordon; Ranworth; Barton.

L. gibba L. Abundant in a ditch just north of Yarmouth.

L. polyrrhiza L. Ranworth.

Alisma ranunculoides L. Flordon; Alderford; on the Thorpe side of Sprowston Grange; South Repps Common.

Sagittaria sagittifolia L. Ellingham; Thorpe; Hellesdon; Ranworth; Attlebridge. 28. Thetford, 1835, *hb. Salmon.*

Butomus umbellatus L. 28. Thetford, 1835, *hb. Salmon.*

Triglochin palustre L. Roydon, near Diss; Wroxham. 28. Thetford, 1836, *hb. Salmon.*

Potamogeton polygonifolius Pour. Alderford; South Repps Common. 28. Beetley Common.

P. coloratus Hornem. Roydon, near Diss.

P. alpinus Balb. Hoveton Broad, half-way up "Hudson's Bay," abundant.

P. prælongus Wulf. Locally abundant. River Bure, near the entrance to Wroxham Broad; canal near Antingham; Barton Broad, abundant; Trowse, in plenty. 28. In a brook about a mile west of East Dereham.

P. perfoliatus L. Trowse; Ellingham; Barton Broad.

P. crispus L. Sprowston; Swafield to Bradfield. 28. Roudham.

P. zosteræfolius Schum. Canal near Antingham; Barton Broad.

P. Friesii Rupr. Canal near Antingham; Barton Broad; Swafield to Bradfield.

P. pusillus L. Swafield.—Var. *tenuissimus* Koch. Ellingham; Norwich to Hellesdon; Alderford.

Ruppia rostellata Koch. 28. Wells.

Zannichellia palustris L. Crostwick; Norwich to Hellesdon; Bradfield to Swafield, very fine. 28. Burnham, *hb. Salmon.* Wells to Holkham.

Eleocharis multicaulis Sm. South Repps Common.

Scirpus pauciflorus Lightf. I believe I gathered this in Beeston Bog, near Cromer.

S. cæspitosus L. Newton St. Faith's. 28. Breckles Fen, near Thetford, *hb. Salmon.*

S. fluitans L. Behind Sprowston Grange, towards Thorpe; Alderford Common.

S. setaceus L. Yarmouth; South Repps Common. 28. Roudham.

S. Tabernæmontani Gmel. Ormesby. 28. East and west of Wells.

S. Caricis Retz. Roydon by Diss; margin of Antingham Pond.

Carex dioica L. South Repps Common.

C. pulicaris L. Bradfield; Beeston by Cromer. 28. Stanford Warren, *hb. Salmon.*

C. disticha Huds. Wroxham; Barton Turf.

C. teretiuscula Good. Roydon; Acle; Hoveton; Barton Turf.

C. paradoxa Willd. Ranworth, in plenty.

C. paniculata L. Beeston St. Andrew; Cawston to Aylsham; Wroxham; Barton Turf.

C. vulpina L. Marsham; Wroxham; Cley. 28. Scarning; Wells.

C. muricata L. Mousehold Heath; Horsford; Witton; Wroxham. 28. Castleacre; Swaffham.

C. echinata Murr. South Repps Common; Beeston by Cromer.

C. remota L. Arminghall.

C. curta Good. On the west side of Barton Broad, in some quantity in one spot.

C. ovalis Good. Roydon by Diss. 28. Larlingford.

C. Hudsonii Ar. Benn. Near Acle Bridge; Ranworth; Barton Turf; Antingham. 28. Larlingford; Thetford.

C. acuta L. Ranworth.

C. binervis Sm. Gunton and Holt, *hb. Salmon*. Sprowston; Ormesby.

C. distans L. Abundant between Wells and Holkham.

C. extensa Good. Plentiful near Wells towards Holkham.

C. flava L. (aggr.). Hoveton; South Repps Common. — Var. *Œderi* Retz. Potter Heigham, *F. T. Richards*. Roydon by Diss; near Sprowston Grange. — Var. *cyperoides* Marsson. Alderford Common.

C. filiformis L. Acle; Ranworth; Hoveton.

C. hirta L. Roydon by Diss; Wymondham; Sprowston; Trimingham; North Walsham; Cromer. 28. Rushford.

C. Pseudo-cyperus L. Flordon; by Filby Broad, in nice quantity.

C. acutiformis Ehrh. Type common. — Var. *Kochiana*. 28. Both sides of the river near Brandon.

C. rostrata Stokes. Newton St. Faith's, *hb. Salmon*. Roydon by Diss; Hoveton; Ranworth; Barton Turf; South Repps Common. 28. Brandon.

Panicum glabrum Gaud. (sub nom. *Digitaria humifusa* Pers.). Ditchingham, near Bungay, D. Stock, 1850, *hb. Salmon*.

Spartina stricta Roth. Cley, G. R. Leathes, *hb. Salmon*.

Alopecurus myosuroides Huds. 28. Larlingford.

A. fulvus Sm. Sprowston. 28. Ringmere, Roudham. In both cases where water had receded in a dry summer.

Milium effusum L. Arminghall Wood. 28. Narford.

Phleum pratense L. var. *nodosum* (L.). Trimingham; Sprowston. 28. East Harling; Thetford to Rushford; Swaffham.

P. phalaroides Koel. 28. Gayton, near Lynn, B. D. Wardale, 1844, *hb. Salmon*. East Harling to Kuettishall, in small quantity; Thetford to Rushford, in fair plenty.

P. arenarium L. Cromer. 28. Thetford, 1835, *hb. Salmon*, and towards Rushford; East Harling to Knettishall.

Polypogon monspeliensis Desf. Cley, Rev. G. R. Leathes with D. Turner and Mr. Borrer, 1809, *hb. Salmon*. 28. Wells to Holkham, in plenty by a ditch which had been lately cleared out, 1884.

Calamagrostis epigeios Roth. Behind Sprowston Grange, on the borders of Thorpe.

C. lanceolata Roth. Filby Broad; Hoveton.

Apera Spica-venti Beauv. Sprowston; Beeston St. Andrew; Crostwick; very plentiful, 1885. 28. Kilverstone Lane, Thetford, *hb. Salmon*.

Deschampsia flexuosa Trin. 28. Roudham; Larlingford; Swaffham.

Holcus mollis L. Geldeston; Hellesdon; Sprowston; Wymondham; Ormesby, frequent; Blickling; Cromer. 28. North Elmham; Larlingford; Swaffham; Newton.

Trisetum pratense Pers. Ellingham; Witton. 28. Thetford; Swaffham; Newton.

Avena pratensis L. 28. Thetford. — Var. *longifolia* Parnell. 28. Near Swaffham.

Sieglingia decumbens Bernh. 28. Lexham Heath.

Koeleria cristata Pers. Norwich Cemetery, perhaps introduced with grass-seed. 28. Larling; East Harling to Knettishall; Thetford to Rushford; Swaffham.

Molinia varia Schrank. Newton St. Faith's; Cawston; Ormesby. 28. North Elmham.

Catabrosa aquatica Beauv. Beeston St. Andrew; Yarmouth.

Poa compressa L. Ellingham.

Glyceria plicata Fr. Kirby Cane.

G. aquatica Sm. Ellingham; Flordon; Thorpe. 28. Thetford, *hb. Salmon.*

G. maritima M. & K. Yarmouth.

G. distans Wahl. On the east side of Wells.

Festuca procumbens Kunth. On the South Dene, Yarmouth.

F. rottboellioides Kunth. Cromer; abundant on the cliffs, Mundesley.

F. ambigua Le Gall. 28. Roudham; East Harling to Knettishall; Croxton Heath; Thetford to Rushford.

F. sciuroides Roth. Thorpe to Sprowston; Paston; Swafield.

F. ovina L. Mousehold Heath. 28. Thetford, *hb. Salmon.*

F. rubra L. 28. Larlingford; Swaffham. — Var. *grandiflora* Hackel, named by Dr. Hackel. Caister by Yarmouth.

Bromus ramosus Huds. Geldeston. 28. Swaffham.

[*B. tectorum* L. In some quantity on waste land that had gone out of cultivation on the Suffolk side of the river near Thetford.]

B. madritensis L. and *B. maximus* Desf. As casuals in sown grass, Sprowston.

B. racemosus L. and *B. commutatus* Schrad. Sprowston.

B. mollis L. var. *interruptus* Hackel. 28. A little north of Thetford Station, 1884.

Agropyron junceum Beauv. Mundesley.

Nardus stricta L. Newton St. Faith's; Sprowston. 28. Thetford, *hb. Salmon.* North Elmham; Roudham; Newton.

Elymus arenarius L. Bacton; Mundesley. 28. Brancaster, *Miss Wardell in hb. Salmon.*

Lomaria Spicant Desv. Marsham; Sprowston.

Asplenium Adiantum-nigrum L. Cawston; Barton Turf.

A. Ruta-muraria L. Barton Turf Church.

Athyrium Filix-fœmina Roth. Arminghall Wood; Sprowston; Swafield to Knapton. 28. Downham, *hb. Salmon.*

Scolopendrium vulgare Symons. Knapton; Paston.

Polystichum angulare Presl. Barton Turf.

Lastræa Thelypteris Presl. Abundant about Ranworth Broad; Barton Broad.

L. Oreopteris Presl. Copse near Sprowston Common, also near Sprowston Grange.

Osmunda regalis L. Sprowston; Barton Turf.

Ophioglossum vulgatum L. Meadows, Earlham Hall; Thorpe, behind Sprowston Grange; Ranworth; Barton Broad.

Equisetum maximum Lam. Cromer.
E. limosum L. Ellingham; Thorpe; Barton Broad. — Var. *fluviatile* (L.). Heigham by Norwich; Bradfield.
Chara fragilis Desv. Roydon by Diss.
C. polyacantha Braun. Roydon by Diss.
C. hispida L. Roydon by Diss; Alderford; Ranworth.
C. vulgaris L. Roydon by Diss; Flordon; Attlebridge.

To the above list may be added *Salix acuminata* Sm., north side of the river, by the Dolphin Ferry, Norwich; I know of no other locality in the county for this willow.

Two species mentioned above are perhaps unrecorded—*Lepidium Draba* for v.-c. 27, and *Ononis spinosa* for 28.

Every effort has been made to avoid repeating recorded stations in this paper; and if any such repetitions occur, it has happened inadvertently, except in rare cases where confirmation seemed desirable.

NEW ORCHIDS FROM COSTA RICA.

By A. B. Rendle, M.A., D.Sc.

I am indebted to M. Barbey for the two species described below. The plants were collected in Costa Rica by Mr. A. Tonduz, and flowered in M. Barbey's collection at Chambésy, where I saw them a few weeks ago.

Pleurothallis Simmleriana, sp. nov. Pusilla foliis anguste lanceolatis, apice minute tridenticulatis; racemo solitario, floribus 5 in apice pedunculi filiformis congestis, bracteis scariosis, ovatis vel rhomboideo-ovatis, cuspidatis, pedicellis valde geniculatis; sepalis ochraceis cum nervis 3 sanguineis striatis, et sanguineo-punctulatis, dorsali sublanceolato-oblongo, apice acuto, lateralibus liberis, asymmetricis, oblongo-lanceolatis, ad apicem acutum attenuatis; petalis atro-sanguineis, rhomboideo-spathulatis, apice breviter subacuto; labello ad pedem columnæ articulato, sanguineo, oblongo, 3-nervato, basi attenuato, sub apice rotundo minute denticulato; columna sanguineo alato, clinandrio dentato, anthera uniloculare, polliniis pyriformibus flavis.

A small plant with leaves 3 cm. long by ·5 cm. broad, and scapes 4·5 cm. long bearing 2 scarious tubular sterile bracts with a cuspidate apex, 3·5 mm. long. The flowers open singly, following each other closely at the top of the scape; each springs from the axil of a whitish multinerved bract 3–4 mm. long; flower-stalks strongly kneed, 5 mm. long, ovary 1·6 mm. Sepals with three broad deep crimson veins on a pale dull ochre ground, dotted with crimson between the veins, 7 mm. long by 2 mm. broad, the adjacent margins of the lateral sepals almost straight, their base 1·5 mm., united with the foot of the column; petals 3 mm. long by a little over 1 mm. broad above the middle; lip 3 mm. long by 1·4 mm. broad; column 2·5 mm. by ·75 mm., foot 1·5 mm. long.

A distinct species of the *Apodæ cæspitosæ* section.

Hab. Costa Rica, *A. Tonduz*. Flowered by M. W. Barbey at Chambésy, near Geneva, after whose gardener, M. Paul Simmler, the species is named by request.

Physosiphon minor, sp. nov. Planta pumila foliis anguste ellipsoideis apice vix emarginatis, basi in petiolum brevem angustatis; racemo solitario, 8–10-floro, internodiis tenuibus, bracteis brevibus truncatis; floribus ochraceis vix 4 mm. longis, sepalis ad medium connatis, lobis subæqualibus; petalis minutis spathulatis obtusis; labello ad pedem columnæ articulato atro-sanguineo ellipsoideo, lobo terminali suborbiculare recurvato, lobis lateralibus brevibus, loborum margine crispulato; columna anguste alata; anthera subsphærica, polliniis breviter pyriformibus.

Leaves 3·5–4 cm. long, barely 1 cm. broad; the scarious bract sheathing base of leaf and raceme barely 1 cm. long. Raceme 7–8 cm. long, 2–2·5 cm. below the lowest flower; fertile bracts scarious, tubular, broadening above, 2 mm. long; pedicels 3 mm. long, sepaline cup barely 2 mm. long, lobes blunt, erect; petals one-nerved, 1 mm. long, less than ·5 mm. broad at the top, of a pale dirty yellow; lip deep crimson, ellipsoidal below the apical lobe, less than 2 mm. long, ·75 mm. broad, lateral lobes very shallow; column 1·5 mm. long, foot ·75 mm.; ovary 1·5 mm. long.

A distinct little species, most resembling *P. guatemalensis* Rolfe, but with flowers barely half the size.

Hab. Costa Rica, *A. Tonduz*. Flowered by M. W. Barbey at Chambésy, near Geneva.

PELLIA NEESIANA Limpr. IN BRITAIN.

By Symers M. Macvicar.

This hepatic, which I have recently found in three localities in Moidart, West Inverness, has apparently not been previously known from the British Isles. The essential points, inflorescence and fruit, which distinguish it from its allies, are only to be found at an earlier period of the year than that at which many botanists can search suitable localities, and the plant has probably been overlooked for *P. calycina*, or forms of *P. epiphylla* with narrow fronds. It is probably widely distributed in Britain.

In Moidart *P. Neesiana* occurs in wet grassy ground, associated with *Chiloscyphus polyanthos* and *Mnium punctatum*. The fronds bear considerable resemblance to those of *P. calycina*, the species being undistinguishable with certainty when barren. The younger fronds are reddish brown to dark green, frequently wavy at the edges; the older ones are dark brown, narrower, and flat. It also resembles *calycina* in being dioicous, but the male plant is without the hammer-shaped furcate innovations of the latter. The most distinctive character between the two species lies in the structure of the interior layer of the capsule wall, *calycina* being entirely without rings, while the present plant agrees with *epiphylla* in

being furnished with them. The involucre forms a complete ring, as in *calycina*, the cylinder varying in length, but never so long as is frequently seen in the latter. The calyptra is more or less exserted, sometimes only slightly beyond the involucre, but more commonly for some distance, and frequently as much as in *epiphylla*. It is usually included in *calycina*.

Pellia epiphylla differs in being paroicous, the antheridia being on the same frond as the female, and it has commonly much broader fronds, which are generally green. The darker coloured narrower forms cannot be distinguished with certainty in the barren state from *Neesiana*. Besides the difference of the inflorescence, *P. epiphylla* also differs from the two other species in that its involucre does not form a complete ring, the antical portion being absent; and the mouth of the involucre looks towards the apex of the frond, while in the others it is vertical. The calyptra is always highly exserted. The anterior layer of the capsule wall has much more numerous rings than in *Neesiana*.

Regarding the vertical distribution of the three species in Britain, *P. calycina* appears to be confined to the low ground. I have seen *epiphylla* at 2500 ft. on the west coast of Scotland, and it probably reaches considerably higher. As *Neesiana* attains a higher altitude and latitude in Norway than *epiphylla* does, it is to be expected that it should be found on our hills. On looking for it this year up to 2000 ft., all the plants which I saw in fruit were *epiphylla*. The latter, however, fruits much more freely than the dioicous species. Specimens of *P. Neesiana* from Moidart have been confirmed by Mr. Pearson and Herr Kaalaas. *Jungermania endiviæfolia* Dicks. is the same plant as *J. calycina* Tayl. according to Lindberg; and this being so, Dickson's specific name has priority over Taylor's for our *calycina*.

SHORT NOTES.

CERASTIUM APETALUM Dumort. — During the springtime of the present year I have been paying special attention, in continuation of observations made several years ago, to the above plant—more generally known among British botanists as *Cerastium glomeratum* b. *apetalum* Dumort.—with the result that the opinion then formed of this plant has been confirmed. Observation has shown me that this apetalous form of *Cerastium glomeratum* is characterized not merely by the absence of petals, but by conditions which are really more physiological than otherwise. The flowers are strictly cleistogamous; the calyx remains closed, and the sepals do not separate until the ovary, developing into the fruit, forces them apart. The petals, generally absent, are in some flowers present in a dwarfed state. The stamens seem to be reduced in number to five or so. The five stigmas are apparently shorter than the stigmas of normal flowers. Each stigma is a rather striking object when examined with the microscope, as it consists of elongated cells which towards the apex of the stigma form erect, spreading, or deflexed finger-like

papillæ. The centre of each stigma is traversed by a fibro-vascular strand with annular vessels. Examination of young flower-buds shows that the fertilization of the flower is effected in this closed condition. Not only can loose mature pollen-grains be seen adhering to stigmas, but it is usually the case that these have developed pollen-tubes. In the instalments which have appeared in this Journal of Mr. F. N. Williams's "Critical Notes on some Species of *Cerastium*," it is interesting to recall that there are two forms of the genus (both referred to *C. glomeratum* as varieties) which stand apart from typical *C. glomeratum* in much the same way as var. *apetalum* does. These are *C. castratum* Kittel and *C. consanguineum* Weddell; the former possessing five fertile stamens only, and the latter with apetalous flowers. It may very well be that these three forms—*apetalum*, *castratum*, and *consanguineum*—represent a series of physiological states rather than varieties. I find that var. *apetalum* usually grows with ordinary *C. glomeratum*, so the cleistogamy is perhaps due to neither the influence of soil nor light.—Charles E. Britton.

Euphorbia Portlandica in Cheshire. — My correspondent of many years, Miss E. Foulkes Jones of Chester, formerly of Llansilin in Denbighshire, last autumn sent me her entire herbarium to examine for Salopian, Denbigh, Montgomery, and other records. In it I found a sheet of *Euphorbia Portlandica* L. marked "Hoylake, H. Bell, 1869." As this species had not been reported for Cheshire in any Flora of Liverpool, nor observed by me during a visit to Hoylake in 1893, though I saw it abundantly on quite similar ground near Blundellsands in the same month, I made special inquiry (in view of another species admittedly represented by a specimen taken into Mr. Bell's garden, though originally found as an escape) as to whether it might not be *ex hort.*, and only representative of the north of Liverpool locality. Mr. Bell stated that Miss Jones's plant certainly was not from his garden, nor from Blundellsands, and promised to look out for it in the following spring. The question is now set at rest. I have this morning (June 7) received through Miss Jones a number of quite fresh specimens gathered by Mr. Bell on June 4, accompanied by a letter in which that gentleman, who resides at Greenfield, West Kirby, gives their place of growth as "on the banks of the Dee, between Hoylake and West Kirby." The species is not mentioned in Lord de Tabley's *Flora of Cheshire*. But, curiously, it *is* named for Cheshire in Top. Bot. ed. ii. on the authority of Lord de Tabley himself—"J. L. Warren, cat."—William Whitwell.

Mathiola incana in Sussex (p. 169).—Mr. Whitwell directs our attention to a notice of this plant in the Transactions of the Chichester Natural History Society, No. 8, new series (1889), pp. 26–28, quoted by the Rev. F. H. Arnold from a letter by Mr. R. D. Postans, of Eastbourne, written in 1888. Mr. Postans says: "I think that you will be interested to know that a Stock which I cannot distinguish from *Mathiola incana* grows on the cliffs at Rottingdean, near Brighton, and has been growing there in

a wild state for more than thirty years. I first saw it five years ago, but I did not then know how rare and local *M. incana* is in England. I have again visited the spot for the purpose of more closely inspecting the locality, and trying to ascertain how long the plant has been growing there. I find that the plant is spread over the cliff from top to bottom for a length of about 750 yards. For about 600 yards the cliff is 70 feet high, and for the remaining 150 the height varies from 70 to 20 feet, so that the area over which the plant occurs is between three and four acres in extent. The eastern boundary of the locus is about 300 yards west of Rottingdean town, and the western boundary (almost opposite the end of the road that leads to Ovingdean) is about 750 yards further west. I could not count the plants, but little and great they are certainly in hundreds, and no one, taking all the facts into consideration, could doubt that the plant has been established there for a great many years. Indeed, Col. Stead (the son of the rector of Ovingdean), who has known the spot for forty years, tells me that as far back as he can recollect the plant has grown wild there. How it came there I suppose no one can now say for certain. There is a cottage on the cliff above, the garden of which is separated from the cliff by a grassy road fifteen yards wide, from which the seed may have escaped; but, however that may be, it is certain that for thirty-five years (and I think probably for fifty years) the plant has been established there as a wild plant. It is rather curious, if the plant originated from seed from the garden, that it has spread about 350 yards eastwards and 350 yards westwards, because the prevailing wind at the time when the seed is scattered is westerly."

IMPATIENS GLANDULIFERA Royle (pp. 50, 87).—When I was at Durham, about eight years ago, there was a grove of this close to the Prebend's Bridge, high enough to bury the cows.—C. B. CLARKE.

[In the *Flore des Pyrénées-Orientales* by MM. G. Gautier and Ch. Flahault (1898) this plant is recorded from "Mare a Ria," and a note is appended: "Espèce de l'Himalaya tendant a se naturaliser en France où elle est déjà connue au Mont Saint-Michel" (p. 474).—ED. JOURN. BOT.]

VICIA LUTEA L. IN JERSEY.—I found this plant on May 29th growing in fair profusion on a rocky bank near Mont Orgueil Castle. This is an entirely new addition to our local flora—indeed, with one exception, to that of the Channel Islands. Babington (Prim. Floræ Sarnicæ, 1839) mentions it as being found, though very sparingly, near Le Ree Barracks, Guernsey; but neither he nor any later botanists have ever noted it as occurring in Jersey.—STANLEY GUITON.

BUXBAUMIA APHYLLA L. IN STAFFORDSHIRE. — The occurrences of this moss are so rare and uncertain, that bryologists will be interested to hear that I have recently met with a few plants of it on bare dry soil in the parish of Armitage, on the outskirts of Cannock Chase. This is a new record for Staffordshire. It is to be hoped that in this case the moss may make an exception to what is said to be its rule of not reappearing in the same locality.—H. P. READER.

Draba muralis in Edinburghshire. — In a recent visit to Glen Farg, I collected *Draba muralis* L. in quantity; the same plant is a weed in fields to the south of Edinburgh. There is no doubt that the plant is a native of Scotland, though, from the absence of lime on the surface, it is very local with us.—A. Craig Christie.

[The plant is not given for Edinburghshire by Mr. Peter Ewing in his *Glasgow Catalogue*; but there is in the National Herbarium a specimen collected "about Edinburgh" in 1839, and another from "Arniston, Edinburgh" (not dated) from the Herbarium of the Botanical Society of London.—Ed. Journ. Bot.]

Tragopogon pratensis L. var. grandiflorus.—In a note on this plant in this Journal for 1899 (p. 342) I omitted to add that the name var. *Symei* in the *London Catalogue*, ed. 9, is synonymous with *T. pratensis* L. var. *grandiflorus* Syme, E. B. ed. 3, v. 139 (1866).—Arthur Bennett.

Symphytum patens Sibth. — May I be allowed to say that my note upon this plant (Journ. Bot. 1893, p. 116) was published under a misapprehension that came about as follows:—A strange Comfrey had been brought to me from Bath, and shortly thereafter I saw the same plant bordering a corn-field in Jersey. Endeavouring to find a name for these specimens, I turned to E. B. ed. iii., and found my plant well figured as *S. officinale* var. *patens* Sibth. Having no suspicion of the accuracy of this figure, I published the note in question, and did not become aware till long afterwards that I had been misled, and that *patens* was probably a trivial variation hardly worthy of a name. The draughtsman for E. B. must have had the wrong *Symphytum* before him, or the drawing was mislabelled, for neither it nor the Bath plant with the characters I mentioned (still unnamed) can have anything to do with *S. officinale*.—James W. White.

NOTICES OF BOOKS.

Flora of Tropical Africa. Vol. v. Part ii. London: Lovell Reeve. Pp. 193–384. Price 8s. net.

The long delay which interrupted the progress of the African Floras edited at Kew seems to have given place to a gratifying activity; and the present instalment follows rapidly on the heels of its predecessor, which was noticed in this Journal last November. It contains Mr. Clarke's *Acanthaceæ*, the *Myoporinæ* and *Selagineæ* by Mr. Rolfe, and the conclusion of the *Verbenaceæ* and part of the *Labiatæ* by Mr. J. G. Baker, one genus of the former order (*Cyclocheilon*) being undertaken by Dr. Stapf. It would not be possible in these pages to review the whole of the work; but we propose to make a few notes on one genus, which may be taken as an example of the treatment of the rest.

At the outset, however, we may be allowed to express regret that a considerable amount of synonymy must result from the inclusion in this instalment of a large number of Welwitsch's plants

which have been described and printed, though not published, for the forthcoming part of Mr. Hiern's Welwitsch Catalogue. These unnecessary additions to nomenclature might easily have been avoided, if a course had been pursued similar to that which by mutual consideration prevented a like inconvenience in the treatment of the *Acanthaceæ*. We are sure that no blame attaches either to Mr. Baker or Mr. Hiern for this want of reciprocity, but the result is none the less inconvenient. Synchronization is often inevitable when botanists at different centres are working independently at the same group of plants—it will not be surprising, for example, if some of the *Clerodendrons* published by Dr. Gürke in the part of the *Bot. Jahrbuch* bearing date May 22nd should be identical with, and should therefore anticipate, some of Mr. Baker's species described in this part of the African Flora; but it is obvious that a very little care would suffice to avoid the duplication of names by botanists working in different parts of London.

It is not merely with regard to nomenclature that comparison would have been desirable. In the genus *Clerodendron*, for example, Mr. Baker has three species—*C. hysteranthum*, *C. megasepalum*, and *C. orbiculare*—founded on three Welwitsch plants. Welwitsch's number for the first is not quoted, but the two numbers cited for *C. megasepalum* and *C. orbiculare* manifestly belong to the same species. The type of *hysteranthum* is not, we are informed, in the Kew Herbarium, nor is there any plant so named by Mr. Baker in the British Museum series of Welwitsch's plants. We have every reason to suppose that the species is based on Welwitsch no. 5688, which number is cited by Mr. Baker as the type of his *orbiculare*. There can be little if any doubt that the three names represent only one species. A number (5662) quoted under *C. volubile* quite certainly represents a very distinct plant, which is not, we believe, to be found in the *Flora;* this and other points would probably have been clearly observed if the British Museum set of Welwitsch's plants had been more thoroughly examined and quoted—in this genus alone Mr. Hiern cites nineteen numbers which are not in Mr. Baker's monograph. The National Herbarium, indeed, has been somewhat insufficiently examined, and the distribution of the species would in some instances—e.g. *C. sinuatum*, which in the Flora is confined to Upper Guinea, but of which we have specimens collected by Perottet in Senegal—have been extended had the Herbarium been thoroughly investigated. Nor does it appear that the literature of the genus has been exhausted, and it is difficult to account for the omission of certain names cited in the *Index Kewensis*, except on the supposition—which we believe is supported by facts—that Mr. Baker's MS. was prepared before that useful work of reference was published. Some of the names localized for "Afr. trop." in the *Index* are Madagascar species—it must always be remembered that the geographical distribution is the weakest point of the work; but it is difficult to account for the omission of *C. triflorum* Vis.*

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* This species dates from Ort. Bot. Padova, 1842, p. 137, not from "Illustr. Piante Nov. Ort. Padov." 19 (1844), as given in the *Index*.

from Nubia (Kotschy), or of any reference to *C. Whitfieldii* Seem. The latter was published in *Bonplandia* (x. 250) in 1862, and subsequently described by Oliver as *C. cephalanthum*—a name which Mr. Baker retains for the variety of *C. capitatum* to which he refers the plant: the figure of *C. capitatum* in Bot. Mag. (4355) should have been cited here.

Again, the name *C. toxicarium* is given in the monograph as if it were published for the first time; reference should have been made to its appearance (without description) in Engler's *Pflanzenwelt Ost-Afrikas*, C. 340, where it stands as of "Bak. msc. in sched. coll. Buchanan n. 1075." The reference to "Bak. msc." is to an incomplete and unpublished though printed list of tentative names distributed with one of Buchanan's collections, which is cited elsewhere in this part as "Buchanan, Nyasaland plants, 1891;" this has not the remotest claim to rank as a publication.

We note an inconsistency in the priority accorded to certain names. On p. 297, for example, "*C. formicarum* Gürke in Engl. Jahrb. xviii. 179" is rightly given precedence over "*C. triplinerve* Rolfe in Bolet. Soc. Brot. xi. 87"; but on p. 321 "*Vitex flavescens* Rolfe in Bolet. Soc. Brot. xi. 87" is retained, while "*V. Mechowii* Gürke in Engl. Jahrb. xviii. 167" is reduced. Prof. Engler's paper was published in December, 1893; Mr. Rolfe's did not appear until the following year.

A comparison between the Welwitsch Catalogue and Mr. Baker's work suggests further criticisms, which, however, may well be deferred until Mr. Hiern's enumeration is published. In the interests of systematists we would appeal to the Editor of the African Floras to see that the unfortunate conflict of names which has arisen on this occasion shall be guarded against in future issues.

First Records of British Flowering Plants. Compiled by William A. Clarke, F.L.S. Second edition, revised and corrected. London: West, Newman & Co. 8vo, cloth, pp. xvi, 194. Price 4s.

This new edition of Mr. Clarke's interesting compilation contains "many desirable corrections," and certain other additions: *e.g.* "the names used by Ray and other old authors" are given in full. This is perhaps an improvement, but if it is used, as Mr. Clarke suggests, "to test the accuracy of [his] identifications without having to refer to the original sources of the extracts," we think it may be mischievous. The information given in the phrases quoted is seldom sufficient for accurate identification; and conclusions can never safely be based upon second-hand citations, however careful these may be. Another addition is that of "the botanist or old author who first used the name, though perhaps not for the same [generic] plant"; and the English names are given in many cases for the genera and in fewer for the species. We do not know what, or whether any, principle determines the selection of these names—why, for example, *Nepeta Glechoma* has its English equivalent while *N. Cataria* is without it—but in all matters

relating to nomenclature, Mr. Clarke is frankly anarchist. As regards the Latin names employed, "Sic volo, sic jubeo; stat pro ratione voluntas" is his motto. He follows the *London Catalogue* except when he prefers the *Index Kewensis*, and when these authorities are in accord, he does not scruple to reject them both in favour of his personal prejudice; e.g. *Ranunculus hirsutus*, which, notwithstanding its unromantic sound, must, we think, possess for Mr. Clarke some tender associations, so resolutely does he cling to it. But this aspect of his work was dealt with at length in our notice of his former issue (see Journ. Bot. 1897, 148–150) and there is no need to say more about it.

Of the interest and usefulness of the book as a whole there can be no question. The quotations, so far as we have tested them, are very carefully done, both as to reference and textual accuracy. Misprints are commendably rare—we note one on p. 74, "Gnaphalium Norgevicum," and the arrangement could only be improved upon by the printing in full at the head of each page the name of the genus under consideration, as is done in the best colonial and other floras: this takes no space, and adds greatly to the convenience of using the book. We note one omission—*Stachys alpina*, which was recorded in this Journal for 1897 (p. 380) and figured in June, 1898. No one who is interested in the history of British botany can afford to be without Mr. Clarke's volume.

Flora der Schweiz: zum Gebrauche auf Exkursionen, in Schulen und beim Selbstunterricht. Bearbeitet von Prof. Dr. Hans Schinz und Dr. Robert Keller. Mit Figuren. Zurich: A. Raustein. 8vo, cloth, pp. vi, 628. Price 6 marks.

The approach of the holiday season renders it desirable at once to call attention to this extremely useful Flora, which has just made its appearance. Those who find Gremli's admirable Swiss Flora insufficient and who are sufficiently at home with German to master botanical descriptions in that language will welcome the full descriptions given in the present volume; the only drawback to the work is its weight (nearly 2 lbs.), which the pedestrian will find no inconsiderable addition to his impedimenta on a blazing summer day.

Every care seems to have been taken to render the work useful to the German student, for whom of course it is primarily intended. There are keys to the genera and species, as well as a detailed description of each, except in the case of monotypic genera, when the species only is described at length. So far as we can judge of the usefulness of a book of this kind without testing it in the field, it would seem an important addition to the literature of European botany. One or two points strike us as undesirable: *e.g.* the omission of authorities after the names, although these are supplied in the excellent index; and the manufacture for each species of a German synonym of the kind of which the "English names" in our own book affords abundant illustration. The typography of the book is excellent.

P. Bubani: *Flora Pyrenæa*, vol. ii., pp. 718. Mediolani, MDCCCC.

This is a posthumous work, carefully edited by Prof. O. Penzig, of Genoa; the first volume was published in 1897, and fully noticed in this Journal for April, 1898; and the third volume is promised for next year. The present volume comprises twenty-nine orders, from *Monotropaceæ* to *Grossulariеæ* inclusive, which are placed in the subclass *Calycifloræ*. The numbering of the orders is somewhat erratic: the first of them is numbered 42, whereas the last order of the first volume bore the same number, and Nos. 56 to 58 in this volume are wanting. The genera and species are not numbered, but there are in all 274 genera and 1020 species included in the twenty-nine orders, besides a few plants mentioned but rejected. For the sake of comparison, it may be noted that the number of species given in Gautier's *Cat. Raisonné Fl. Pyrén.-Orient.* (1898) for the same portion of the vegetable kingdom is about three per cent. greater. This rather large number for a portion only of the Pyrenees is sufficiently accounted for by the different scale of treatment of the genus *Hieracium*, which Bubani deals with on moderate lines and in which he includes twenty-four species, whereas Gautier enumerates a hundred.

As in the first volume, there are found the same critical care taken in the discussion of each plant, the same fulness of synonymy, the same attempt to respect the work of the most ancient authors, the same desire to employ an obsolete or original rather than the regular nomenclature, and in this respect the same disregard for the settled practice of modern masters.

Though there appears to be no new species described, the amount of detailed information largely derived from the personal explorations of the author, and the mass of research into the literature of the subject, should not fail to win the appreciation of all botanists interested in this flora, or wanting special knowledge bearing upon the plants that occur in it. On the other hand, the eccentric nomenclature will be regarded by most botanists as a serious blot, and by many as a fault sufficient to condemn the whole book. The very large number of new and unnecessary names for old and familiar plants will be denounced as a hindrance, and the useful parts of the work will stand in danger of being ignored. The blame must to some extent be shared by the literary executors of the author, by the learned editor, and by all other persons who may be responsible for the publication; since the author died about twelve years ago, it may be justly urged that, if the author had lived to observe the tendency and needs of botanical science as they exist at present, he might perhaps have repented of many or most of the changes which he had proposed, and have learned to see the practical and scientific force of the principles which now govern the choice of names; at all events, so long as they remained only in manuscript they did no harm, and until actual publication completed the work science could not suffer.

The following is a sample—perhaps an awful example—of independent licence, showing the author's method:—The first genus

that he deals with in *Compositæ* is *Lapsana* L.; he explains (p. 44) that *Lampsana* of Dioscorides is a Crucifer, either *Sinapis* or *Raphanistrum*, and contends that therefore it cannot be used for a Composite, especially as *Lapsana* of Pliny is another Crucifer; on these grounds he rejects the usual name and substitutes *Lalda*, a local word which is employed by some Etruscans for the common nipplewort, the plant in question, which he accordingly endows with the scientific name of *Lalda communis*; he refers to Ruellius and Dodoens for further information, and for synonymy quotes *Lampsana communis* of Linnæus and others, *Lapsana communis* La Peyr., *L. vulgatissima* Vaill., *L. Dodonæi* Camer., J. Bauhin, *L. sonchifolia* Gilib., *L. domestica* G. Bauhin, etc.; he then states the times of flowering and fruiting, and the localities where he collected it, together with an account of the kind of places where it occurs, and its principal variations in form, size, and other peculiarities, both in the Pyrenees and elsewhere, and refers to some of its states, such as *L. pubescens* Hornem. and *L. piscidica* "Borb." [? Boiss.]; he concludes with an allusion to some enigmatic observations on the plant in Turkey made by Bellon [Belon] in 1588.

There are about two dozen of new generic names invented by the author after a similar fashion, and he adopts a much larger number of genera from ante-Linnean authors, in lieu of names in common use; the trivial names of species are also freely altered. The ample synonymy, printed, however, in very small type, enables the reader to discover the plants intended. A dispassionate and considerate view of the whole of this elaborate work will disclose many good and valuable features, which it would be unfair to deny simply on account of one conspicuous disfigurement.

W. P. H.

Symbolæ Antillanæ (URBAN). Vol. ii., fascicle 1. Cyperaceæ. By CHARLES BARON CLARKE. 8vo, pp. 8–162. Berlin: Borntraeger. 1900.

WE are glad to note the publication of this fascicle. We trust that Mr. Clarke's complete monograph of the *Cyperaceæ* will not be much longer delayed; in the meantime it is a great help to the systematist to have good catalogues of the members of the order found in various geographic areas, such as South Africa in the *Flora Capensis*, East India in the *Flora of British India*, and the West Indies in the fascicle now before us.

Mr. Clarke enumerates about 250 species, which are contained in twenty-six genera. Here, as elsewhere, he has broken up the unwieldly genus *Cyperus*, the species being distributed under *Pycreus*, *Juncellus*, *Cyperus*, *Mariscus*, and *Torulinium*. The rehabilitation of *Torulinium* Desv. is an innovation; it includes the wide-spread *T. confertum* Ham. (= *Cyperus ferax* L. C. Rich. and a page and three-quarters of other synonyms) and seven endemic American species, which are distinguished from *Mariscus* by the separation of the rhachilla of the ripe spikelet into as many one-seeded joints as

there are nuts, a character which some botanists might regard rather as subgeneric than generic in value. We note that *Dichromena* is still kept distinct from *Rynchospora*, with the remark "forsan in *Rynchospora* potius mergendum"; it is difficult to see on what grounds the two can be generically separated.

Apropos of *Rynchospora*, a point of nomenclature arises: the large number of species described under *Rhynchospora*, as Willdenow spelt it, are regarded as synonyms, so that, except for a few original names of Vahl, most of the species are cited as of Britton or C. B. Clarke; *Rynchospora pseudo-lanata* C. B. Clarke is, however, an unnecessary change for *R. filiformis* Vahl. We note an opportunity for further alterations, which Otto Kuntze has missed; the oldest name for the genus being *Triodon* L. C. Rich. (= *Rynchospora tenerrima* C. B. Clarke), there is a chance for some one to run out a hundred or so of new names, himself the authority. An additional advantage is that a later genus of *Rubiaceæ* will then be squashed.

Mr. Clarke has kindly drawn our attention to a point of much greater interest, which is strongly marked in *Cyperaceæ*—namely, the connection between the North Tropical American and the West African floras. Omitting plants of general distribution, the following well-distinguished species occur both in the West Indies and in West Tropical Africa:—*Kyllinga squamulata* Vahl, *K. Peruviana* Lam., *Pycreus propinquus* Nees, *Juncellus alopecuroides* C. B. Clarke, *Cyperus nudicaulis* Poir., *C. sphacelatus* Rottb., *Mariscus umbellatus* Vahl, *Fimbristylis exilis* R. & S., *F. obtusifolia* Kunth, *Scirpus spadiceus* Boeck., *Rynchospora cyperoides* Britton. Several of these have been discovered, for the first time in the West Indies, by Père Duss in Martinique. It would be interesting to know Mr. Clarke's views as to the solution of this puzzle in geographical distribution. There seems little doubt that the intercourse in connection with slave-traffic is insufficient to account for all the cases, and that the former existence of some other facility for direct communication has to be considered.

A. B. R.

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*ARTICLES IN JOURNALS.**

Bot. Centralblatt (No. 22). — A. Hansgirg, 'Zur Phyllobiologie der *Ficus*, *Coffea* und *Kibara*.' — F. W. Neger, 'Weiteres über *Phyllactinia*.'—(Nos. 23, 24). T. Bokorny, 'Über die Proteinstoffe der Samen.'

Bot. Gazette (25 May). — B. M. Davis, 'Fertilization of *Albugo candida*' (1 pl.). — H. Hasselbring, 'Development of *Trichurus spiralis* and *Stysanus Stemonites*' (2 pl.). — R. W. Smith, 'Sporophylls and sporangia of *Isoetes*' (concl.). — E. B. Copeland, 'Soja

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* The dates assigned to the numbers are those which appear on their covers or title-pages, but it must not always be inferred that this is the actual date of publication.

beans for imbibition experiments'; 'Gas diffusion through the cuticle.'—H. H. Hume, *Puccinia Thompsonii*, sp. n.—W. W. Rowlee & S. P. Nichols, 'Taxonomic value of staminate flowers of Oaks.'

Bot. Magazine (Tokio: 20 April). — T. Ito, 'Plantæ Sineuses Yoshianæ.'—K. Miyake, 'Starch of evergreen leaves.'—T. Makino, 'Bambusaceæ Japonicæ' (cont.).

Bot. Zeitung (1 June). — W. Rothert, 'Die Krystallzellen der Pontederiaceen' (1 pl.).

Bull. Bot. Soc. Belgique (16 June).—T. Durand & E. De Wildeman, 'Matériaux pour la Flore du Congo' (*Gilletiella*, gen. nov. Acanthacearum); *Demeusea*, gen. nov. Amaryllidacearum).

Bull. Torrey Bot. Club (26 May).—G. N. Best, 'North American *Pseudoleskea*' (2 pl.). — E. P. Bicknell, 'Sisyrinchiums of British America.' — W. W. Rowlee, 'N. American Willows' (1 pl.).—A. Nelson, 'New plants from Wyoming.'—J. K. Small, 'N. American plants.' — F. W. Patterson, 'New Fungi.' — W. A. Riley, '*Plowrightia morbosa* spores.' — F. H. Blodgett, '*Darluca* upon Carnation rust.'

Mém. de l'Herb. Boissier (No. 13: 10 May).—J. Freyn, 'Bemerkenswerthe Orientalische Pflanzenarten.' — (No. 14: 30 May). A. Franchet, 'Mutisiaceæ Japonicæ' (1 pl.). — (No. 15: 30 May). E. De Wildeman, 'Quelques Chytridinées nouvelles,'

Nuovo Giorn. Bot. Ital. (April). — F. Cavara, '*Arcangeliella Borziana*, nuova Imenogasterea.' — L. Vaccari, 'Flora delle Alpi Graie.' — A. Preda, 'Il monte Cocuzzo e la sua flora vascolare.'—A. Trotter, 'Entomocecidi della flora italiana.'

Oesterr. Bot. Zeitschrift (June). — R. v. Wettstein, 'Die nordamerikanischen Arten de *Gentiana* § *Endotricha*' (cont.).—J. Freyn, 'Nachträge zur Flora von Istrien.'—L. & K. Linsbauer, 'Teratologische Befunde an *Lonicera tatarica*' (concl.: 1 pl.).—F. Vierhapper, '*Arnica Doronicum* Jacq.' (cont.). — B. Horák, 'Zur Flora Montenegrós' (concl.).—J. Podpěra, 'Zur Flora von Böhmen.'

BOOK-NOTES, NEWS, &c.

The rule which forbids the delivery of lectures in Kew Gardens is no doubt salutary, but it would seem to be enforced with unnecessary rigour. We read in the last number of *Nature Notes* that on May 5, about sixty persons, members of the Selborne and other societies, visited the Gardens, "and the guide, Professor Boulger, endeavoured to give a peripatetic lecture on Adaptation. The Tropical Aroid House was closed, and, after visiting the Succulent House, the party were informed that lecturing of any kind was forbidden in any part of the grounds. After a stroll

through the Alpine Garden, tea, and a visit to the Azalea dell, they accordingly dispersed."

At the annual meeting of the Selborne Society, Mr. Boulger "alluded to the obligations the Society owed to the heads of various public institutions. Their visits to the British Museum, for example, had been a great advantage during the winter. He had, as editor, a great many curious objects sent in to him which the finders were unable to classify, and in matters of this kind the heads of scientific institutions such as the Museum were most obliging. They had, however, met with a reception from one public body which was experienced as a great grievance at the time, but might be yet susceptible of explanation. This was the interdiction on the giving of botanical lectures in Kew Gardens. It was a rule under the Parks Regulation Act which might justifiably be suspended. While it was desirable public parks should not be turned into debating grounds, nevertheless there was a difference between such lectures as they proposed giving and the aggressive utterances of Hyde Park orators. He was decidedly of opinion that in their case the rule should be abrogated." We think most folk will be of Mr. Boulger's opinion, and that the interests of the public might be further consulted in other matters—*e. g.* by the issue of a popular Guide to the Gardens, which has been in abeyance since 1885; now that the scientific work of the Gardens, as represented by the African Floras, is once more progressing, it may be hoped that so important an aid to the popular appreciation of the Gardens may not be much longer overlooked. We note, by the way, that the Kew *Bulletin*, of which the most recent issue bears date "September and October, 1899," is now announced as an "occasional" publication.

The publication of memoirs by women in the Transactions and Journals of learned Societies seems to us to establish an unanswerable argument in favour of their admission as members to the bodies which avail themselves of their contributions. We would suggest, however, that nothing is gained by exaggeration of their claims, of the kind lately put forward by a "woman's" journal on behalf of Mrs. Farquharson, a leading advocate of the proposal. Some twenty years ago, when Miss Marion S. Ridley, Mrs. Farquharson wrote a little book on British ferns, which was noticed in this Journal for 1881 (p. 350); but this hardly entitles her to be considered a "leading botanist."

The latest issue of the *Flora Brasiliensis* (1 April) concludes the monograph of the *Sapindaceæ* by Prof. Radlkofer.

At the meeting of the Linnean Society on June 7th, 1900, Prof. Sydney H. Vines, F.R.S., the new President, in the chair, Dr. Otto Stapf, A.L.S., read a paper on the two Melastomaceous genera *Dicellandra* Hook. f. and *Phæoneuron* Gilg. He showed that the differences between them are not in the heterandry and homœandry respectively, as was supposed, but in much more important characters which concern all those parts which affect the formation

of the fruits and seeds. The diagnoses of the two genera must therefore be revised, with the result that *Phæoneuron* and *Dicellandra* change their character as monotypic genera. The author described two new species of *Phæoneuron*—*P. Schweinfurthii* (Schweinfurth, no. 3166), from Monbuttuland, and *P. Moloneyi*, from Lagos—and reduced *Dicellandra liberica* Gilg. and *D.* (?) *setosa* Hook. f. to *Phæoneuron setosum* Stapf.

Messrs. T. Ito and J. Matsumura are publishing in the Journal of the Science College at Tōkyō a *Tentamen Floræ Lutchuensis*, which seems very carefully done. It is intended as a preliminary contribution to the flora of the Loochoo Islands, and will undoubtedly furnish a useful basis for further investigations. A new *Camellia* (*C. lutchuensis*) and a new *Euonymus* (*E. lutchuensis*) are described by Mr. Ito, and some new *Leguminosæ* by Mr. Matsumura. We note a synonym—"*Hypericum calycatum* Jacq."—which may cause some trouble; it is quoted as "Jacq. ex Dyer in Hook. f. Fl. Brit. Ind. i. 257 [256]." A reference to the *Index Kewensis* shows that the abbreviation "Jacq." here stands not for Jacquin, as is customary, but for Jacquemont. The synonym is quoted from Jacquemont's herbarium, and ought not to have been published.

An International Botanical Congress will be held in Paris on Oct. 1–10. Programmes and all information may be obtained from the Secretary, M. E. Perrot, 272 Boulevard Raspail, Paris.

Mr. E. D. Marquand sends us an interesting paper on "The Flora of Alderney," reprinted from the Transactions of the Guernsey Society of Natural Science for 1899. He enumerates 414 flowering plants as occurring in the island.

Mr. Frederick H. Blodgett, of the New York Agricultural Station, has recently published in Bulletin No. 175 an account of a Carnation rust, *Uromyces caryophyllinus*, which is very destructive to the plants attacked. He has detected lately a small fungus of the *Sphæropsideæ* group—*Darluca filum*—growing on the *Uromyces*. The fungus has long been known in Britain as a parasite on rusts, but it has not been proved to be very effective as a disease or check to its fungus host. Mr. Blodgett proposes, however, to induce the growth of *Darluca* artificially in carnation-houses, and so combat the rust disease. He has no results to record as yet. Two other Bulletins—Nos. 167 and 170—dealing with diseases of fruits caused by insects and fungi, have also been issued. They are the result of much enquiry and study, and give in handy form a popular account of the pests that fruit-growers may have to deal with, and also the remedies that have been found to be of most service in exterminating or keeping them in check.

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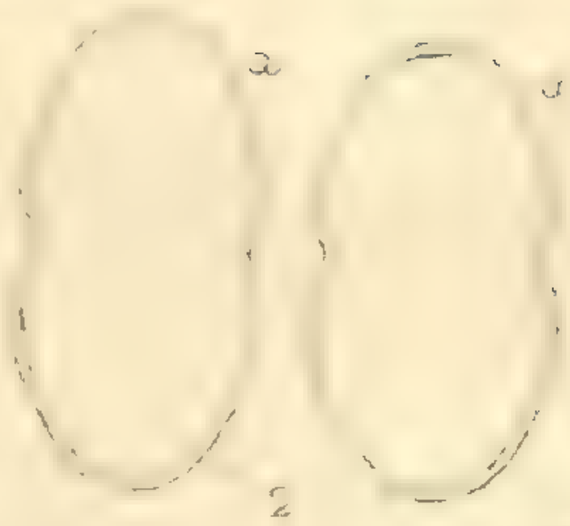

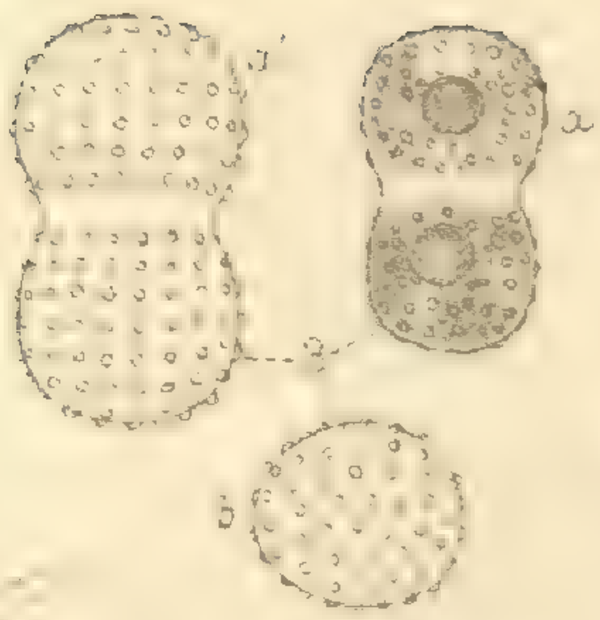

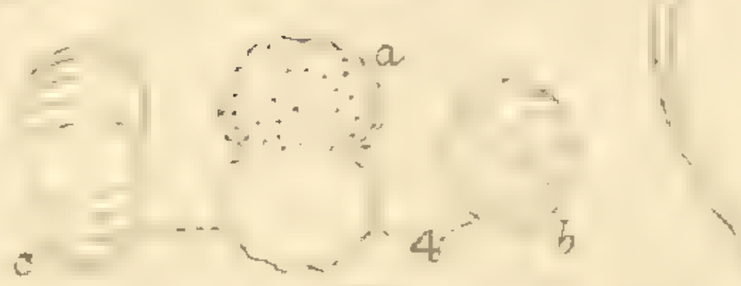

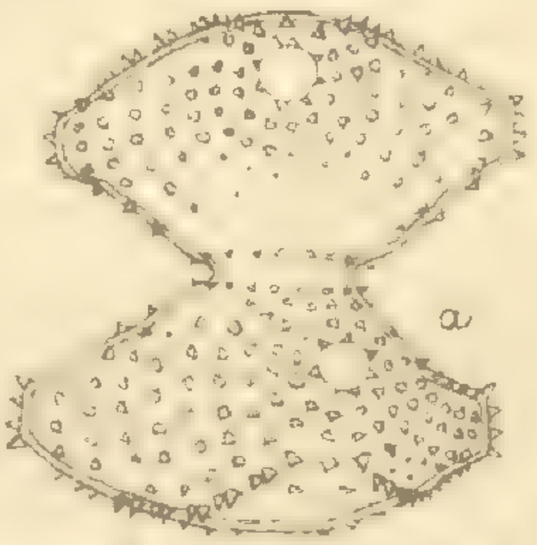

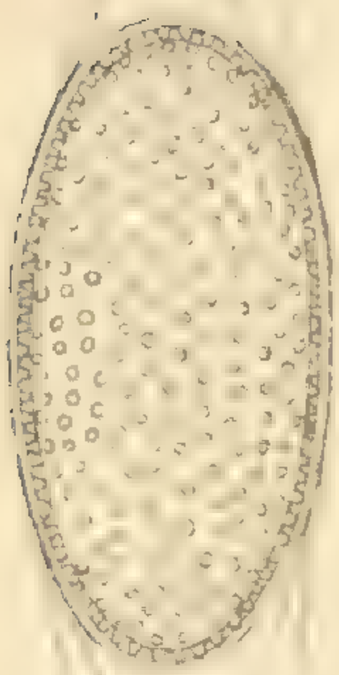

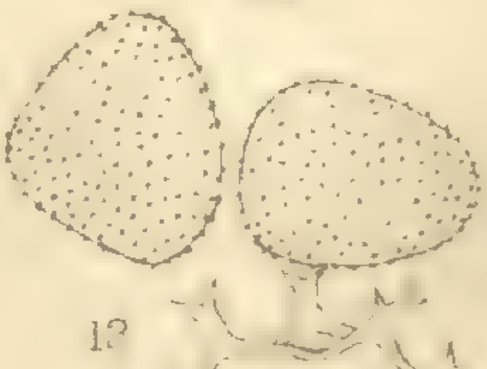

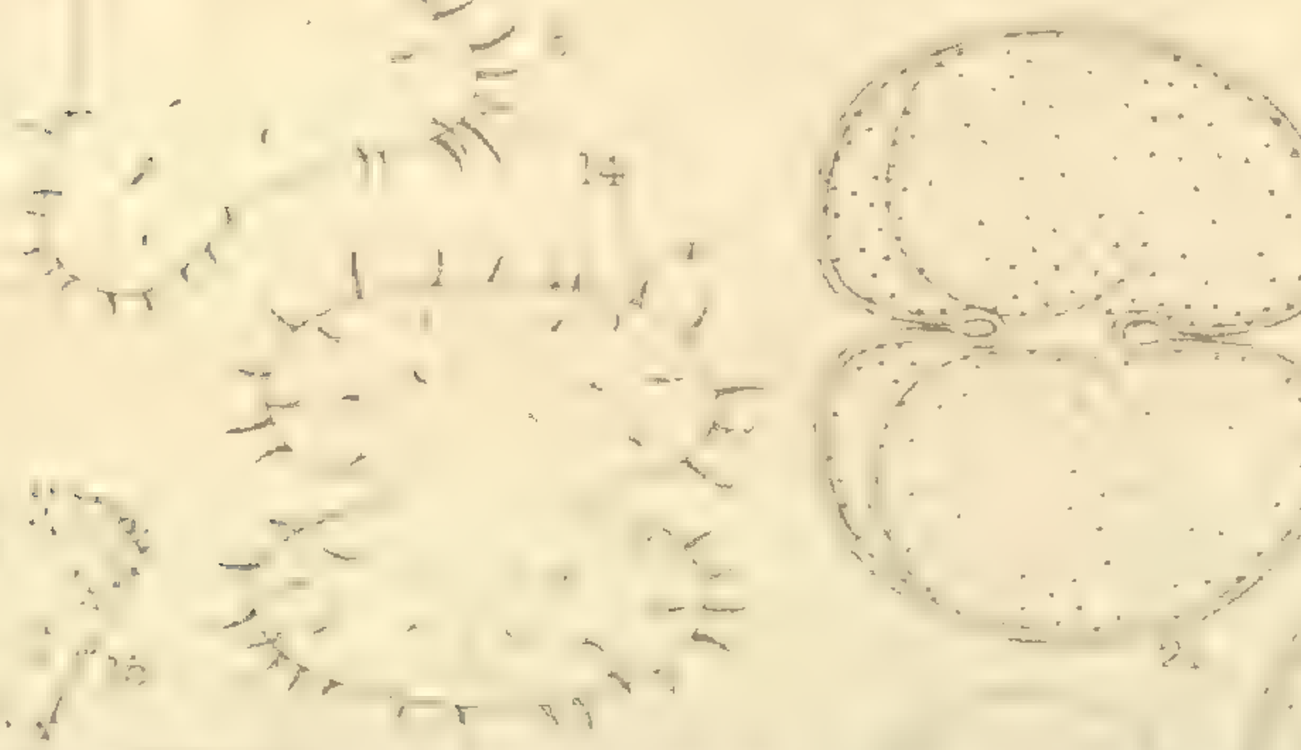

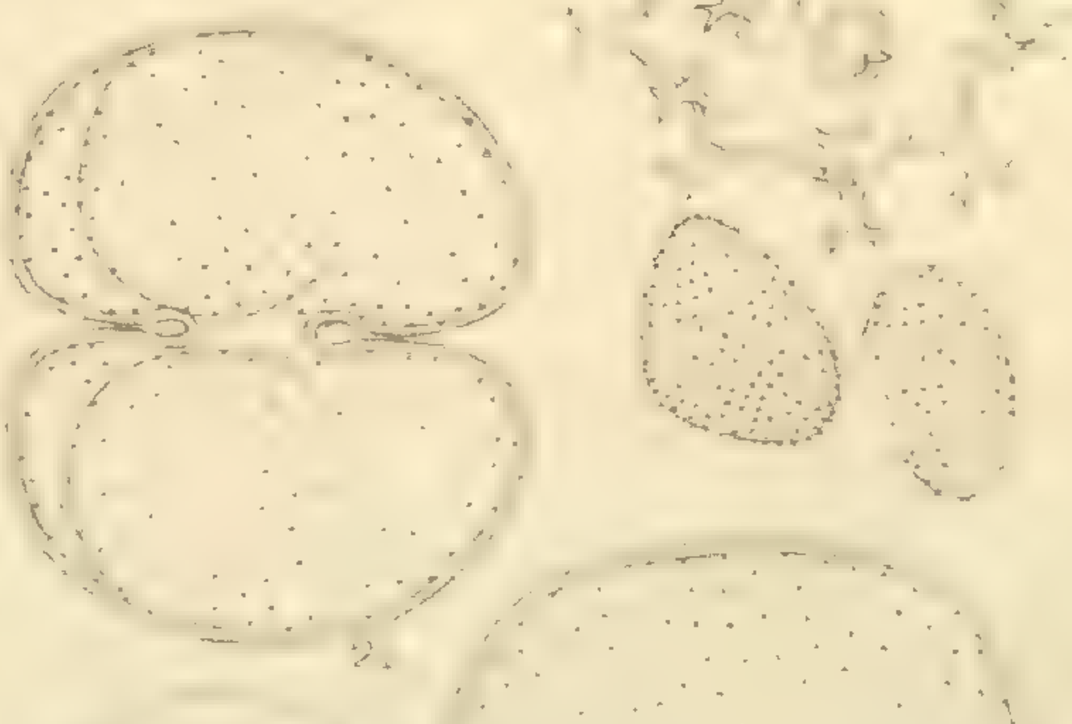

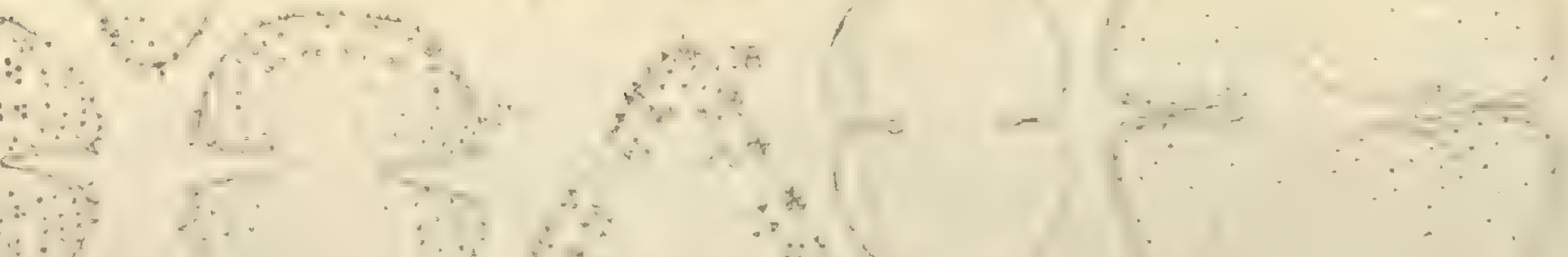

C.N. Wood ad nat. del.
R. Morison lith.

NOTES ON FRESHWATER ALGÆ.—II.

By W. West, F.L.S., and G. S. West, B.A., A.R.C.S.

(Plate 412.)

Within the last year or more a large number of new freshwater algæ have been described from various parts of the world, many of which have been given specific and varietal names on the merest pretext, without due consideration of previously described algæ. In this paper we call attention to a few of these "species" and "varieties" which have been insufficiently considered by their authors.

Some of our German contemporaries are rather apt to found "species" on slight characters which are so subject to variation as to be useless as specific distinctions. A case in point is an article by Lemmermann on "Das Genus Ophiocytium Naegeli" in *Hedwigia*, Bd. xxxviii. 1899. In this paper he gives diagnoses of twelve species and seven varieties of *Ophiocytium* which would be much better reduced to about half a dozen species.

Not enough attention is given to accuracy of figures (especially with regard to the *Desmidiaceæ*), and in many instances the descriptions in the text do not at all correspond to the figures on the plates. Carelessness of observation and draughtsmanship seem to be characteristic of some of the recent investigators of this group of plants.

In this paper we have also attempted to clear up a few doubtful points in connection with certain species of Desmids, and have commented upon several very interesting forms which are somewhat uncommon in this country.

Zygnemaceæ.

1. Debarya calospora (Palla) nob. [Syn. *Mougeotiopsis calospora* Palla in Ber. der Deutsch. Botan. Gesellsch. Jahrg. xii. 1894, Heft 8, pp. 228–236, t. xviii.] We have previously shown this plant to be a true species of *Debarya*; cfr. Ann. Bot. vol. xx. March, 1898. p. 49. The plants we observed certainly possessed pyrenoids, which, as in *D. lævis* (Kütz.) West & G. S. West, varied much in their disposition and size. The zygospores were less elliptical than those figured by Palla. Crass. fil. veget. 13 μ; long. zygosp. 22–26 μ; lat. zygosp. 18–20 μ.

Hab. Pilmoor, near Thirsk, N. Yorks.

Desmidiaceæ.

2. Penium curtum Bréb. var. obtusum, var. n. (Figs. 1–2). Var. major, semicellulis lateribus inferioribus subparallelis, lateribus superioribus levissime concavis, apicibus latioribus subtruncatisque. Long. 41–45 μ; lat. 20–23 μ; lat. isthm. 19 μ.

Hab. Ingleton, W. Yorks.

This distinct variety is rather larger than the typical form, with

the sides at the base of the semicells subparallel and with subtruncate apices, below which the sides are very faintly hollowed.

3. Closterium limneticum Lemmermann in Plöner Forschungsberichten, Teil 7, p. 28, t. ii. f. 39–41. This is merely one of the numerous forms of *C. gracile* Bréb. The figure given by Brébisson (Mém. Sciences Nat. Cherbourg, iv. 1856, t. ii. f. 45) of this widely distributed species is not good, and that given by Cooke (Brit. Desm. pl. 13, f. 8) is a very poor representation of the species. Yet, any one acquainted with gatherings of Desmids from one of their most prolific habitats—*viz.* bogs—must also be acquainted with numerous forms of *C. gracile*.

C. limneticum var. *tenue* Lemmermann, *l. c.* t. ii. f. 42–44, is not an uncommon form of *C. gracile*, especially in the marshy districts of tropical and subtropical countries.

4. Closterium parvulum Näg. var. angustum, var. n. (Fig. 8). Var. minor, cellulis angustioribus. Lat. 7·7 μ; apic. 94–102 μ inter se distantibus.

Hab. Pilmoor, near Thirsk, N. Yorks.

This variety is smaller and considerably narrower than the typical form.

5. **Closterium idiosporum,** sp. n. (Figs. 6 and 7). C. parvum, elongatum; cellulis diametro circiter 20–23-plo longioribus, distincte sed leviter curvatis, parte mediana cellulæ cum marginibus subparallelis, gradatim et gradatim attenuatis et leviter curvatioribus apices versus, apicibus angustissimis sed truncatis; membrana cellularum achroa et glabra. Zygospora anguste elliptica, a vertice visa circularis; membrana subcrassa, dense scrobiculata. Long. 221–238 μ; lat. 10–10·5 μ; lat. apic. 1·7 μ; long. zygosp. 57·5 μ; lat. zygosp. 28·7 μ.

Hab. Wicken Fen, Cambridgeshire.

This species is proportionately shorter than *C. pronum* Bréb., the apices being much less produced and truncate. It is somewhat larger than *C. acutum* Bréb., and its apices are quite different; moreover, the zygospore is remarkably different from the zygospores of *C. acutum*, *C. cornu*, etc.

6. Pleurotænium nodosum (Bail.) Lund. In Plöner Forschungsberichten, Teil 7, t. ii. f. 45, this plant is recorded by Lemmermann as *P. nodulosum* (Bréb.) De Bary.

7. Euastrum lobulatum Bréb. in Mém. Sciences Nat. Cherbourg, iv. 1856, p. 124, t. i. f. 4. [Syn. *E. erosum* Lund. var. *notabile* West in Journ. Roy. Micr. Soc. 1892, p. 723, t. ix. f. 17.]

Distrib. England; Wales; Scotland; Ireland; France.

We have met with this plant so frequently from suitable localities in every part of the British Islands that we began to think it somewhat strange if earlier observers had entirely overlooked it. Latterly, however, we have come to the conclusion that *E. lobulatum*, described by Brébisson in 1856, is most decidedly the plant we have recorded under the name of *E. erosum* var. *notabile*. Brébisson's description and figure are by no means good, but yet the outward form of the

cells, the relative size, and the habit of the plant admit of no other conclusion. We find it frequently in bogs, and the fact that it is invariably associated with Desmids that were perfectly familiar to Brébisson tends to confirm the view that the plant we have had under observation for years as *E. erosum* var. *notabile* is precisely the same as the plant described by Brébisson as *E. lobulatum*.

8. **Xanthidium variabile**, sp. n. [Syn. *X. Smithii* Arch. var. *variabile* Nordst. 1887; in Kongl. Sv. Vet.-Akad. Handl. Bd. 22, no. 8, 1888, p. 44, t. iv. f. 27–29; West and G. S. West in Journ. Roy. Micr. Soc. 1896, p. 156, t. iv. f. 10; G. S. West in Journ. Linn. Soc. Bot. vol. xxvii. 1899, p. 386, t. 8, f. 20–22.]

Distrib. England; Wales; Ireland; British Guiana; New Zealand; Australia.

During the last few years we have obtained this plant from many parts of England, especially from some of the *Sphagnum*-bogs. It often occurs in prodigious numbers, and retains its distinctive characters so constantly that we think it must be regarded as a species quite distinct from *X. Smithii* Arch. Another point of interest is that we have never yet found *X. variabile* associated with *X. Smithii*, although we have had the latter in abundance from several localities in Ireland. *X. variabile* (as indicated by its first describer) exhibits a considerable amount of variation, but, with its great variability, yet no intermediate forms are met with which in any way tend to connect it with *X. Smithii* (cfr. G. S. West, *l.c.* p. 386).

9. Xanthidium tetracentrotum Wolle, 1882; Desm. U. S. p. 95, t. xxii. figs. 8, 9; West & G. S. West, 'N. Amer. Desm.,' Trans. Linn. Soc. Bot. ser. 2, vol. v. p. 253, t. xv. f. 24. [Syn. *Arthrodesmus incrassatus* Lagerh. in Öfvers. af K. Sv. Vet.-Akad, Förh. 1885, no. 7, p. 242, t. i. f. 18.]

Var. quadricornutum (Roy & Biss.) nob. [Syn. *X. quadricornutum* Roy & Biss. in Ann. Scot. Nat. Hist. 1893, p. 245; 1894, t. iv. f. 5.] The species described by Messrs. Roy and Bissett as *X. quadricornutum* scarcely differs in any respect from Wolle's *X. tetracentrotum*, and must therefore be placed merely as a variety of the latter species.

10. Cosmarium cymatopleurum Nordst. var. Archerii (Roy & Biss.) nob. [Syn. *Cosmarium Archerii* Roy & Biss. in Ann. Scot. Nat. Hist. 1893, p. 42, t. i. f. 5.] Long. 91 μ; lat. 67 μ; lat. isthm. 24 μ. (Fig. 5.)

Hab. Penyghent, W. Yorks.

The most remarkable character of this plant is in the drawn-out apices of the semicells, but this feature is insufficient to warrant its separation by Messrs. Roy and Bissett as a distinct species. The specimens observed from West Yorkshire were intermediate between the typical form and the var. *Archerii* with regard to the produced apices; they were also intermediate in size, thus proving that *C. Archerii* and *C. cymatopleurum* are forms of one species.

11. Cosmarium pericymatium Nordst. var. eboracense, var. n. (Fig. 4.) Var. minor; semicellulis cum undulis paucioribus et prominentioribus; membrana punctata. Long. 21 μ; lat. 14 μ; lat. isthm. 10 μ; crass. 12 μ.

Hab. Cautley Spout, W. Yorks.

12. **Cosmarium subtrinodulum**, sp. n. (Fig. 11.) C. submediocre, paullo longius quam latum, profunde constrictum, sinu angusto ad extremo valde ampliato; semicellulæ transverse pyramido-oblongæ, angulis inferioribus subrotundatis, angulis superioribus rotundatis, lateribus et angulis superioribus cum nodulis parvis 3–4, apicibus latis leviter convexis, in centro semicellularum nodulis 3 subtransverse dispositis, circa nodulum unumquemque annulo scrobiculorum parvorum et nonnullis scrobiculis parvis irregulariter dispositis; a vertice visæ ellipticæ, polis undulatis, in medio utrobique subinflatæ et leviter trinodulosæ; membrana crassa. Long. 47·5 μ; lat. 39 μ; lat. isthm. 11·5 μ; crass. 27 μ.

Hab. Bowness, Westmoreland.

This species approaches nearest to *C. trinodulum* Nordst. (in Acta Univers. Lund, 1880, vol. xvi. p. 5, t. i. f. 4), but differs in its rounded basal angles, in the disposition of the nodules at the upper part of the margin of the semicells, in the arrangement of the elevations in the centre of the semicells, in the rings of scrobiculations round these nodules, in the inflated vertical view, and the thickened cell-wall.

13. Cosmarium heterochondrum Nordst. (*l. c.* 1880, p. 5, t. i. f. 3).

Var. mediogemmatum nob. [Syn. *C. mediogemmatum* West & G. S. West, 'Welw. Afric. Freshw. Alg.,' Journ. Bot. 1897, p. 118, t. 367, f. 11.] As *C. mediogemmatum* has such a close affinity with *C. heterochondrum*, we have come to the conclusion that it had better stand as a variety of that species.

14. Cosmarium trilobulatum Reinsch, forma Schmidle in Engler's Botan. Jahrbüch. Bd. 26, Heft 1, 1898, t. ii. f. 8. This form figured by Schmidle does not belong to *C. trilobulatum* Reinsch (in Abhandl. Naturhistor. Gesellsch. Nürnberg, Bd. 3, 1866, p. 116, t. ix. f. vi *a–d*), but to *C. Hammeri* Reinsch, being especially near the forms figured by Reinsch, *l. c.* t. x. f. I *h*, *l*.

15. Cosmarium Pokornyanum (Grun.) nob. [Syn. *Euastrum Pokornyanum* Grun. in Rabenh. Flor. Europ. Alg. iii. 1868, p. 185; *E. binale* (Turp.) Ehrenb. var. *angustatum* Wittr. in Bih. till Sv. Vet.-Akad. Handl. 1872, Bd. 1, no. 1, p. 50, t. iv. f. 8; *E. polare* Nordst. in Öfvers. af K. Vet.-Akad. Förh. 1872, no. 6, p. 37, t. vii. f. 24; *Cosmarium angustatum* (Wittr.) Nordst. *l. c.* 1875, p. 20.]

After a careful study of *Cosmarium angustatum*, we have concluded that *C. Pokornyanum* should be its name. It is a plant which has scarcely ever been referred to under the name of *E. Pokornyanum*, owing most probably to the brevity and meagreness of its original description. On careful consideration, however, we find that Grunow's description agrees in every way with that of *C. angustatum* (or *E. polare*).

Grunow's description of *E. Pokornyanum*:—

"*E. minutum*, quasi prioris [E. Ralfsii Rabenh,] infans; *semicellulis trilobis, lobis basalibus brevibus integris vel margine crenato-bilobulatis, lobo polari porrecto* subcuneato, *apice truncato, leviter inciso-emarginato*, cytiodermate lævi."

Nordstedt's description of the front view of *E. polare*:—

"*E. parvum*, duabus partibus longius quam latius, sinu lineari-angusto; *semicellulæ subhexagonæ trilobæ, lobi lateralibus brevibus, leviter sinuato-bilobulatis, lobo polari sursum attenuato, apice leviter emarginato*, a lobis lateralibus sinu late rotundato discreto, angulis inferioribus subrectis, tumore basali parvo instructæ."

The dimensions given for *E. Pokornyanum* are those given for *C. angustatum;* and the habitats given for the former plant, "in locis paludosis" and "inter muscos madidos," are precisely the kind of locality in which we have been in the habit of finding *C. angustatum*.

Gutwinski (in Spraw. Rom. fizyjogr. Akad. Umiej. Krakow. tom. xxx. p. 103, t. iii. f. 40) has described a Polish plant under the name of *E. Pokornyanum* Grun. var. *subcrassicolle* Gutw., which could undoubtedly be referred to *C. angustatum*, and therefore Gutwinski, by referring a form of *C. angustatum* to *E. Pokornyanum*, unconsciously confirms the fact that the two species are identical.

E. Pokornyanum having been described four years previous to *E. binale* var. *angustatum*, the specific name "Pokornyanum" must take precedence.

16. Cosmarium subexcavatum nob. [Syn. *C. excavatum* Nordst. var. *ellipticum* Wille in Öfvers. af K. Vet.-Akad. Förh. 1879, no. 5, p. 47, t. xiii. f. 46; *C. isthmium* West, var. *Willei* West in Journ. Linn. Soc. Bot. vol. xxix. p. 160; *Dysphinctium Willei* Schmidle in Hedwigia, Bd. xxxiii. 1894, p. 94.] This plant differs so considerably from *C. excavatum* Nordst. that it must necessarily be considered as a distinct species. Schmidle evidently arrived at the same conclusion, but placed it under the genus *Dysphinctium*. There is already a species named *Cosmarium Willei* Lagerh.

Var. ordinatum, var. n. [Syn. *D. Willei* Schmidle forma Schmidle, *l. c.* p. 95, t. vi. f. 2.] Var. paullo longius quam forma typica; granulis parvis, in seriebus verticalibus et horizontalibus ordinatis. Long. 29–37 μ; lat. 17–21 μ; lat. isthm. 11·5–13·5 μ. (Fig. 3.)

Hab. Ingleton, W. Yorks, on dripping rocks.

In the plants examined there were about six horizontal and about eight vertical series of granules on each semicell.

Var. æquinoctiale nob. [Syn. *C. æquinoctiale* West & G. S. West, 'Welw. Afric. Freshw. Alg.,' Journ Bot. 1897, p. 44, t. 365, f. 11.] On further consideration we are inclined to regard *C. æquinoctiale* as a variety of *C. subexcavatum*.

17. Cosmarium subpunctulatum Nordst. in Botan. Notiser, 1887, p. 161; Kongl. Sv. Vet.-Akad. Handl. Bd. 22, no. 8, 1888, p. 47, t. v. f. 8. Zygospora globosa, verrucis magnis ornata; verrucæ

annulo spinarum parvarum ad apicem et in centro annulorum cum spina breve tenue bifurcata instructæ. Diam. zygosp. sine verruc. 30 μ, cum verruc. et spin. 49 μ. (Fig. 9.)

Hab. Thursley Common, Surrey.

We give a figure of a zygospore of this species obtained from amongst *Utricularia minor*. It is a very beautiful zygospore, and not unlike that of *C. punctulatum* Bréb.

18. Cosmarium Logiense Bissett in Journ. Roy. Micr. Soc. 1884, p. 194, t. v. f. 4. Quite recently this species has been recorded by Borge from Cuba (cfr. Bih. till K. Sv. Vet.-Akad. Handl. 1899, Bd. 24, Afd. iii. no. 12, p. 19, t. i. f. 21), that author describing and figuring what he considers to be the true plant. We must, however, entirely disagree with him in this, as his West Indian *Cosmarium* is by no means typical *C. Logiense*. We have observed this species from many parts of the British Islands, especially from the Lake District, and we find it to agree very well with Messrs. Roy and Bissett's figure in Ann. Scot. Nat. Hist. 1894, t. ii. f. 15. Borge's plant possesses semicells of quite a different form from those of typical *C. Logiense*: they are much too elliptical, and are without the basal angles always found in specimens of *C. Logiense*. The granules on his plant are also too few in number.

19. Cosmarium Favum West & G. S. West in Trans. Linn. Soc. Bot. ser. 2, vol. v. p. 250, t. xv. f. 5, 6. Schmidle has recently placed this species as a variety of *C. margaritatum* (Lund.) Roy & Biss. (cfr. Schmidle in Bih. till K. Sv. Vet.-Akad. Handl. Bd. 24, Afd. iii. no. 8, p. 36), but his reasons for this we are at a loss to understand. We have examined large numbers of *C. margaritatum* from many parts of the world, and, as we pointed out when we described it, *C. Favum* has not the outward form of that species (cfr. also Roy & Biss. in Ann. Scot. Nat. Hist. 1894, t. ii. f. 12). Apart from this, the peculiar external sculpture of the cell-wall, which consists of a large number of subhexagonal depressions [hence the name "*favum*"], at the base of which is a large granule, is sufficient to readily distinguish it from the well-known sculpture of *C. margaritatum*.

20. Cosmarium subochthodes Schmidle, var. major Schmidle, 'Lappmark u. Vesterbott. Süssw.-alg.,' Bih. till K. Sv. Vet.-Akad. Handl. Bd. 24, Afd. iii. no. 8, p. 36, t. i. f. 51. We fail to see any difference between this plant and numerous specimens of *C. cymatopleurum* Nordst. var. *tyrolicum* Nordst. We have previously shown that what Schmidle described as "*C. subochthodes*" was partly *C. cymatopleurum* var. *tyrolicum* and partly *C. Botrytis* var. *mediolæve*.

21. Cosmarium delicatissimum Lemmermann, 'Beitr. Kenntn. Planktonalg.,' Botan. Centralbl. Band lxxvi. 1898, p. 4 (sep.). The description of this species is so meagre that it will answer equally well for several well-known species, but at the same time it does not *describe* any of them. It is imperfect descriptions of this kind that we deplore, as they are of no use to true systematic

botany, but cause endless trouble and synonymy. Had Lemmermann known of the existence of such well-marked species as *C. tenue* Arch., *C. minutissimum* Arch., *C. pygmæum* Arch., and *C. pygmæum* Arch. var. *Schliephackianum* (Grun.) West & G. S. West, he could not have intended his three and a half lines of imperfect description to convey the idea of yet another distinct species of minute *Cosmarium*.

22. Staurastrum subtrifurcatum Schmidle in Engler's Botan. Jahrbüch. Bd. 26, Heft 1, 1898, p. 56, t. iii. f. 17. This plant described by Schmidle is merely a large form (forma *major*) of *S. subtrifurcatum* West & G. S. West, 'N. Amer. Desm.,' Trans. Linn. Soc. Bot. ser. 2, vol. v. 1896, p. 258, t. xvi. f. 24. It seems rather strange that Schmidle should have given the same name as we did two years previously to the same plant.

23. Staurastrum Brasiliense Nordst. var. Lundellii West & G. S. West, *l. c.* 1896, p. 259. [Syn. *S. Brasiliense* var. *Lundellianum* Schmidle in Bih. till K. Sv. Vet.-Akad. Handl. 1898, Bd. 24, Afd. iii. no. 8, p. 58.] We must remind Schmidle that the name "var. *Lundellii*" was given to *S. Brasiliense* forma Lundell (in Acta R. Soc. Scient. Upsal. ser. 3, viii. 1871, p. 73, t. iv. f. 39) some two years previous to his name of "var. *Lundellianum*."

Note.—*Xanthidium Stuhlmannii* Hieronymus (in Engler, Die Pflanzenwelt Ost-Afrikas und der Nachbargebiete, Theil C, Berlin, 1895; Schmidle in Engler's Bot. Jahrbüch. Bd. 26, Heft 1, 1898, t. iii. f. 7) is certainly a form of *S. brasiliense*.

24. Staurastrum aculeatum (Ehrenb.) Menegh. var. bifidum Schmidle, *l. c.* p. 55, t. ii. f. 44. This is undoubtedly a form of *S. forficulatum* Lund., and has nothing whatever to do with *S. aculeatum*. Cfr. also G. S. West in Journ. Linn. Soc. Bot. vol. xxxiv. p. 394–5.

In the same paper Schmidle records "*S. forviculatum* Lund. var. *longicornis* Schmidle" in his text (*l. c.* p. 55), and "*S. longicorne* Schmidle" in his description of plates (*l. c.* p. 70)! Although the plant he thus records is certainly a variety of *S. forficulatum*, approaching var. *enoplon* West, yet it does not resemble *S. forficulatum* nearly so much as his so-called *S. aculeatum* var. *bifidum!*

25. Staurastrum cosmospinosum (Börges.) nob. [Syn. *S. aculeatum* (Ehrenb.) Menegh. subsp. *cosmospinosum* Börges. in Botanisk Tidsskrift, Bd. 17, Heft 3, Kjöbenhavn, 1889, p. 147, t. vi. f. 8; *S. rostellum* Roy & Biss. in Ann. Scot. Nat. Hist. 1893, p. 242; 1894, t. iii. f. 3.] We have recently obtained this plant from the West of Ireland, and have verified our idea that the plant described by Messrs. Roy and Bissett as *S. rostellum* is unquestionably identical with Börgesen's *S. aculeatum* subsp. *cosmospinosum*. Although Börgesen's name of "cosmospinosum" must take precedence, yet Roy was the more correct in placing it as a species quite apart from *S. aculeatum*.

The complete characters of *S. aculeatum* will be found discussed in Journ. Linn. Soc. Bot. vol. xxxiv. pp. 393–395.

26. **Staurastrum erostellum**, sp. n. [Syn. *S. rostellum* Roy & Biss. var. *erostellum* West & G. S. West, 'F. W. A. of S. of Engl.,' Journ. Roy. Micr. Soc. 1897, p. 493, t. vi. f. 18.] S. minutum, tam longum quam latum, profunde constrictum, sinu valde aperto acutangulo; semicellulæ subobreniformes, apicibus subrectis vel leviter convexis, membrana spinulis brevibus validis in seriebus subconcentricis circa angulos obsessa, spinulis paullo longioribus ad angulos; a vertice visæ triangulares, lateribus leviter concavis, angulis subrotundatis. Long. sine spin. 19·5 μ; lat. s. spin. 19·5 μ; lat. isthm. 6·5 μ.

Hab. Thursley Common, Surrey.

This plant differs from *S. cosmospinosum* nob. (= *S. rostellum* Roy & Biss.) in the smaller size, in the deeper constriction and different form of the semicells, in the absence of the large spine at the angles of the semicells, and in the triangular vertical view with more rounded angles.

The relative size, number, and arrangement of the smaller spines is the same as in *S. cosmospinosum*, although in the latter species they do not increase in length towards the angles.

27. Staurastrum Brebissonii Arch. var. ordinatum Schmidle in Bih. till K. Sv. Vet.-Akad. Handl. Bd. 24. Afd. iii. no. 8, 1898, p. 53, t. iii. f. 1. This variety is merely typical *S. erasum* Bréb. (in Mém. Sciences Nat. Cherbourg, iv. 1856, p. 143, t. i. f. 28).

28. Staurastrum gladiosum Turner, var. delicatulum, var. n. (Fig. 14.) Var. spinis delicatioribus, interdum leviter curvatis, paucioribus inter angulos. Long. sine spin. 37·5 μ, cum spin. 44 μ; lat. sine spin. 38·5 μ, cum spin. 50 μ; lat. isthm. 14 μ.

Hab. Malham Tarn, W. Yorks.

The form of the cells and the number and length of the spines are nearer those of *S. gladiosum* than any other species. The semicells are more depressed than in *S. teliferum*, and the spines are longer and more delicate.

29. Staurastrum inconspicuum Nordst. var. minor Schmidle in Bih. till K. Sv. Vet.-Akad. Handl. Bd. 24, Afd. iii. no. 8, 1898, p. 56, t. ii. f. 35. Whatever this variety may be, it is certainly not a form of *S. inconspicuum* Nordst.

30. Staurastrum Hibernicum West, 'F. W. A. of W. Ireland,' Journ. Linn. Soc. Bot. vol. xxix. 1892, p. 177, t. xxiii. f. 6. As this species has been referred by some authors to *S. orbiculare* Ralfs, var. *extensum* Nordst., we give a figure of each for comparison (*S. Hibernicum*, fig. 20; *S. orbiculare* var. *extensum*, fig. 19). *S. Hibernicum* is much larger, with well-marked basal angles and a somewhat flattened apex, and the vertical view possesses much broader angles. The cell-membrane is also delicately punctate, the punctulations being rather far apart ["membrana lævis," West, *l. c.* p. 177, is erroneous]; that of *S. orbiculare* var. *extensum* is perfectly smooth.

Var. Farquharsonii (Roy & Biss.) nob. [Syn. *S. Farquharsonii* Roy & Biss. in Ann. Scot. Nat. Hist. 1893, p. 237; 1894, t. iv. f. 3.]

There is no doubt that *S. Farquharsonii* is merely a more depressed variety of *S. Hibernicum*, as it is of approximately the same size, and it possesses the basal angles of the semicells and the delicate punctulation of the cell-wall. We have recently obtained this variety in abundance from Hampsfell, Lancashire. (Fig. 21.)

31. Staurastrum pygmæum Bréb. Zygosporæ globosæ, mamillatæ, mamilla conica unaquaque spina longa tenue prædita, apicibus spinarum bis bifurcatis (subdichotomis). Diam. zygosp. sine spin. 36–37 μ, cum spin. circiter 67 μ. (Fig. 12.)

Hab. Cautley Spout, W. Yorks.

We have had zygospores of this species from Leça, Portugal, and they agreed exactly with those from Yorkshire. We must therefore consider the zygospore figured in Ralfs Brit. Desm. t. xxxv. f. 26*c* as immature with regard to its spines.

The specimens observed from Cautley Spout (with zygospores) were rather more depressed than usual, and the lines of granulation were a little further apart. Long. 29–31 μ; lat. 29–30 μ; lat. isthm. 9 μ.

32. Staurastrum punctulatum Bréb. We give a figure of a zygospore of this species for comparison with that of *S. pygmæum*. It was obtained from a pond in Darenth Wood, Kent. Diam. zygosp. sine spin. circ. 29 μ, cum spin. circ. 42 μ. (Fig. 13.)

33. Staurastrum Arnellii Boldt, 'Siber. Chlor.,' Öfvers. af K. Vet.-Akad. Förh. 1885, no. 2, p. 112, t. v. f. 21. We have recently found this rare species in abundance from W. Yorks, and also from N. Wales. The typical form has only previously been recorded from Siberia, but Roy describes a var. *inornatum* as "extremely rare; near Alford, Aberdeen." We give a figure of some of the N. Wales examples, which were from a boggy spring on Y Foel Fras. Long. 35·5–38·5 μ; lat. 32·5–38·5 μ; lat. isthm. 9·5–11 μ. (Figs. 15–18.)

34. Staurastrum Borgeanum Schmidle, 'Lappmark u. Vesterbott. Süssw.-alg.,' Bih. till K. Sv. Vet.-Akad. Handl. 1898, Bd. 24, Afd. iii. no. 8, p. 60, t. iii. f. 7. We obtained this characteristic species in some abundance from a bog near Widdale Beck, N. Yorks. As the figure given by Schmidle is a poor one, and gives a very inadequate idea of the appearance of the plant, we give a figure of one of the specimens we observed. Long. 45 μ; lat. 41 μ; lat. isthm. 12 μ. (Fig. 10).

35. Staurastrum Lagerheimii Schmidle, *l.c.* p. 63, t. iii. f. 10. This species is merely a short-armed variety of *S. anatinum* Cooke & Wills. Specimens of *S. anatinum* frequently possess one semicell almost exactly similar to the form described by Schmidle as *S. Lagerheimii*. It has shorter processes than either var. *truncatum* West or var. *biradiatum* West, but the arrangement of the verrucations is on exactly the same plan.

36. Staurastrum Sebaldi Reinsch, var. altum (Boldt) West & G. S. West in Trans. Linn. Soc. Bot. ser. 2, vol. v. 1896, p. 267.

[Syn. *S. proboscideum* Arch. var. *altum* Boldt in Öfvers. af K. Vet.-Akad. Förh. 1885, no. 2, p. 117, t. vi. f. 34; *S. altum* Schmidle in Bih. till K. Sv. Vet.-Akad. Handl. 1898, Bd. 24, Afd. iii. no. 8, p. 62.]

We have previously shown that *S. proboscideum* var. *altum* Boldt must be considered as a variety of *S. Sebaldi* Reinsch. It is a frequent American variety, and often occurs in large numbers amongst all forms of *S. Sebaldi*. It only differs from the type in the prominent convex apex, the arrangement of the spines and emarginate verrucæ being the same.

Palmellaceæ.

37. Scenedesmus arcuatus Lemmermann in Plöner Forschungsberichten, Teil 7, p. 17, t. i. f. 2–4. This is merely a form (by no means an uncommon one) of *S. bijugatus* (Turp.) Kütz.

38. Rhaphidium polymorphum Fresen. var. mirabile West & G. S. West in Journ. Roy. Micr. Soc. 1897, p. 501, t. vii. f. 9–13. In a recent paper by Lemmermann (*l. c.* p. 29) that author has placed this variety as a distinct species—*R. mirabile* Lemmermann. *In this he is absolutely wrong.* When we described the variety, we illustrated very clearly its variability both by the description and the figures. It occurred as solitary cells amongst large numbers of specimens of all forms of *R. polymorphum*, and all stages were noticed between it and the var. *falcatum*. [One of these stages we figured: cfr. West & G. S. West, *l. c.* f. 12.] Finally, we feel bound to state that there is not the slightest evidence for regarding it otherwise than as a peculiar form of *R. polymorphum*.

He also states [Lemmermann, *l. c.* p. 28, footnote] that "W. et G. S. West haben kürzlich die Vermutung ausgesprochen, dass Cl. pseudospirotænium var. mirabile Lemm. mit Rhaphidium polymorphum var. variabile W. et G. S. West identisch sei." We can only say that we still retain that suspicion, as he bases his difference between *Closterium* and *Rhaphidium* mainly on the presence or absence of pyrenoids. He remarks: "Rhaphidium hat dagegen keine Pyrenoide," whereas we frequently find pyrenoids in species of *Rhaphidium*, and also in the allied genera *Scenedesmus* and *Dactylococcus*. Moreover, he includes *Closterium subtile* Bréb. as a species of *Closterium*, whereas it has unquestionably been proved to be *Rhaphidium polymorphum* var. *aciculare* (A. Br.) Rabenh.

Note.—In the same paper, which is entitled 'Das Phytoplankton sächsischer Teiche,' Lemmermann has described a plant which he names *Closteriopsis longissima*. He places this plant in the *Desmidiaceæ* between *Closterium* and *Pleurotænium*, but *Closteriopsis, whatever it may be, is certainly not a Desmid*. Most probably it is a *Rhaphidium* of the nature of *R. longissimum* Schröder.

39. Oocystis Marssonii Lemmermann in Bot. Centralbl. 1898, Bd. 76, p. 151; Plöner Forschungsb. Teil 7, p. 24, t. i. f. 15–19. We fail to see how this species can with any reason be distinguished from *Oocystis crassa* Wittr. in Wittr. & Nordst. Alg. Exsicc. 1879.

DESCRIPTION OF PLATE 412.

a, a′ = front view (a fronte visa).
b = vertical view (a vertice visa).
c = side view (a latere visa).

All the figures are magnified 520 diameters.

FIG. 1–2. *Penium curtum* Bréb. var. *obtusum*, var. n. 3. *Cosmarium subexcavatum* nob. var. *ordinatum*, var. n. 4. *Cosmarium pericymatium* Nordst. var. *eboracense*, var. n. 5. *Cosmarium cymatopleurum* Nordst. var. *Archerii* (Roy & Biss.) nob. 6–7. *Closterium idiosporum*, sp. n. 8. *Closterium parvulum* Näg. var. *angustum*, var. n. 9. *Cosmarium subpunctulatum* Nordst.; zygospore. 10. *Staurastrum Borgeanum* Schmidle. 11. *Cosmarium subtrinodulum*, sp. n. 12. *Staurastrum pygmæum* Bréb.; zygospore. 13. *Staurastrum punctulatum* Bréb.; zygospore. 14. *Staurastrum gladiosum* Turn. var. *delicatulum*, var. n. 15–18. *Staurastrum Arnellii* Boldt. 19. *Staurastrum orbiculare* Ralfs, var. *extensum* Nordst. 20. *Staurastrum Hibernicum* West. 21. *Staurastrum Hibernicum* West, var. *Farquharsonii* (Roy & Biss.) nob.

PLANT NOTES FROM SUTHERLAND AND CANTIRE.

BY C. E. SALMON.

AT the end of July, 1899, I was enabled to spend a few days in Sutherland, botanizing chiefly amongst the hills in the western vice-county near Inchnadamph, a small village in as wild a tract of country as is possible in Great Britain, I believe. A halt for a few hours at Lairg, on the way, gave the opportunity to add one or two plants to the East Sutherland list, but there was no time to do more.

Inchnadamph appears a good centre to work several interesting-looking mountains—Ben More Assynt (3273 ft.), Canisp (2779 ft.), Quinag (2653 ft.), Suilven (2399 ft.), and others. The first has a number of attractive spurs and cliffs that time would not allow exploring; it was interesting to see *Luzula arcuata* still plentiful in one compact patch on the way to the summit, where it was recorded many years ago. There is no doubt whatever that the four localities in Watson's *New Botanist's Guide* (1835) are all one and the same place. Canisp, unfortunately, had to be taken on a very unfavourable day, clouds of mist and rain frequently sweeping over the mountain, and leaving one with views limited to but six or eight feet! On some of the walks round Inchnadamph I had the advantage of the company of H. N. Dixon, W. E. Nicholson, and my brother, who were investigating the moss-flora of the district.

From Inchnadamph I journeyed south to Kilmichael of Inverlussa, on the west coast of Cantire, where I had arranged to spend the remainder of my holidays. This proved to be a delightfully situated spot near the head of Loch Sween, with many extremely picturesque and fascinating bays and islets. Here several additions to the county list were discovered: amongst them *Cephalanthera ensifolia*. I was much interested in this find, as, although unrecorded in *botanical* works up to the present time, this species was set down as occurring in North Knapdale (Cantire) (by the Rev. D. Maclachlan) in a book I accidentally came across whilst in Cantire,

entitled *The Statistical Account of Argyleshire, by the Ministers of the respective Parishes*, dated 1845.

As usual, I am much indebted to Mr. Arthur Bennett for help in many ways, and also to Messrs. F. Townsend, H. & J. Groves, E. S. Marshall, E. F. Linton, etc., for their kindness in examining many of the specimens. An asterisk denotes a new (as far as I can ascertain) county record.

Sutherland East (107).

**Spergula sativa* (Bœnn.). Lairg.
**Galium Witheringii* (Sm.). North side of Loch Shin, Lairg.
**Artemisia vulgaris* L. South side of Loch Shin, Lairg.
**Lobelia Dortmanna* L. Loch Shin, Lairg.
Euphrasia Scotica* Wettst. North side of Loch Shin, Lairg.—E. brevipila* Burn. & Grem. South side of Loch Shin, Lairg. "Some of the specimens approach *borealis* Towns.," *F. Townsend.*
Nitella opaca Ag. Loch Shin, Lairg.

Sutherland West (108).

Castalia speciosa Salisb. var. *minor* DC. East end of Loch Assynt.
Draba incana L. Allt-nan-Uamh Valley, south of Inchnadamph.
Viola lutea Huds. f. *amœna* (Symons). Cliffs immediately overlooking Inchnadamph.
Silene acaulis L. North slopes of Canisp.
Cerastium arcticum Lange. Canisp, at about 2500 ft., scarce.
Sagina subulata Presl. Near foot of Coinnemheall.
**Spergula sativa* (Bœnn.). Cultivated field, Inchnadamph.
Rubus saxatilis L. Frequent about Inchnadamph.
Alchemilla vulgaris L. var. **alpestris* (Schmidt). Inchnadamph.—Var. **filicaulis* (Buser). Ben More Assynt.
Epilobium alsinefolium Vill. By the Traligill Burn above Inchnadamph; Allt-nan-Uamh Valley, south of Inchnadamph. — **E. alsinefolium* × *obscurum* Schreb. (= *E. rivulicolum* Haussk.). By the Traligill Burn above Inchnadamph. — *E. anagallidifolium* Lam. Glas Bheinn; north slopes of Canisp.—*E. anagallidifolium* × *alsinefolium*. Glas Bheinn.
Cornus suecica L. Lower slopes of Coinnemheall.
Gnaphalium supinum L. A tall form on Canisp, at about 2300 ft., which Mr. Bennett reports is between type and var. β *fuscum* of Syme's E. B.
Saussurea alpina DC. Limestone cliffs south of Inchnadamph; near Loch Maol-a'-Choire; north slopes of Canisp.
**Centaurea Cyanus* L. Cultivated field, Inchnadamph.
**Hieracium Marshalli* Linton. Limestone cliffs in Allt-nan-Uamh Valley, and limestone rocks near Loch Maol-a'-Choire. "Beyond being rather more glandular in the peduncles (which limestone cliffs might account for), this seems to be very good *H. Marshalli* mihi; a great extension northwards of its range," *E. F. Linton.* — *H. anglicum* Fr. var. *longibracteatum* F. J. H. Beinn-an-Fhuarain.—*H. iricum* Fr. Near Loch Maol-a'-Choire; Beinn-an-Fhuarain; by

the Traligill Burn, Inchnadamph, "a curiously narrow-leaved form" (*fide E. F. Linton*). — **H. murorum* L. var. *sarcophyllum* Stenstr. Canisp, at about 2000 ft. A striking-looking neat plant with sinuous stem and crisp dark-edged leaves. — *H. cæsio-murorum* Lindeb. Glas Bheinn. "I think *H. cæsio-murorum* Lindeb. with more deciduous flocc. down than usual and less of it," *E. F. Linton*.

Vaccinium uliginosum L. Meallan Liath Mor.

Gentiana baltica Murb. (*fide W. H. Beeby*). Inchnadamph, varying with pure white flowers.

Euphrasia brevipila Burn. & Grem. Meadow, Inchnadamph.—*E. curta* Fries. By Loanan River, near Inchnadamph.—*E. gracilis* Fries. Inchnadamph.—*E. Scotica* Wettst. Inchnadamph.

**Rhinanthus major* Ehrh. Cultivated field, Inchnadamph. No fruit could be found, so it is uncertain to which segregate it belongs. —*R. Crista-galli* L. var. *Drummond-Hayi* F. B. White. Canisp, at about 2000 ft. A well-marked variety.— *R.* ——. An interesting form grew by the Loanan River, Inchnadamph, in some plenty. It was from 3–9 in. high, usually a good deal branched below the middle of the stem; stem spotted. Leaves very narrow, linear, obtusely serrate, spinulose at margins and beneath. Calyx glabrous, but ciliate at margins; corolla small, yellow and purple, very hairy on the back. This seems to agree with plants found by Messrs. Marshall and Hanbury between Tain and Portmahomack (Journ. Bot. 1891, p. 113), named subsequently by Prof. Lange *R. angustifolia* Koch; only these Inchnadamph specimens are much smaller, which may be accounted for by their growing usually amongst short sheep-cropped turf. The original description of *R. angustifolia* runs as follows in Gmel. Fl. Bad. ii. p. 669:—"Caule brachiato ramosissimo, foliis sessilibus, linearibus angustis obtuse serratis, calycibus glabris." The author further adds that it is distinguished from *R. Crista-galli* by the longer (2–3 ft.) more slender stems, and the numerous glabrous divided erecto-patent branches; stem and branch-leaves linear, very narrow, ½ to scarcely 1 line wide, 1 in. long, patent, bracts ovate-acuminate, sharply serrate, more lougly pointed; flowers terminal on stem and branches, in a subspicate-racemose head; calyx and corolla twice as small; habitat, always stony mountains; time of flowering (July and August).

Pinguicula lusitanica L. Glas Bheinn.

Oxyria digyna Hill. Inchnadamph; north slopes of Canisp.

Salix herbacea L. Canisp, at 2500 ft.

Habenaria albida R. Br. Glas Bheinn.

Juncus trifidus L. Canisp, north side.

Carex rupestris All. Quite plentiful on limestone cliffs immediately behind Inchnadamph, and was also seen in the locality mentioned in Journ. Bot. 1891, p. 116. — *C. rigida* Good. Canisp, at 2000 ft.—*C. Goodenowii* J. Gay, var. *juncella* (T. M. Fries). By the Loanan River, Inchnadamph. — *C. pilulifera* L. var. *longibracteata* Lange. Glas Bheinn.

**Deschampsia flexuosa* Trin. var. *montana* Hook. fil. Canisp, at 2700 ft.

Poa glauca Sm. Canisp, at 2000 ft. — **P. nemoralis* L. var. *glaucantha* Reich. Beinn-an-Fhuarain.

Hymenophyllum unilaterale Bory. Glas Bheinn.

**Isoetes lacustris* L. Two lochs on Glas Bheinn.

Chara fragilis Desv. Glas Bheinn ("approaching var. *barbata*," *H. & J. Groves*).—*C. fragilis* Desv. var. *delicatula* Braun. East end of Loch Assynt; Loch Maol-a'-Choire, near Inchnadamph. — *C. vulgaris* L. ("form with only 1–2 corticate segments," *H. & J. Groves*). Stream from Loch Maol-a'-Choire.

Nitella opaca Ag. Loch Maol-a'-Choire.

Cantire (101).

**Thalictrum alpinum* L. At about 800 ft. on hills east of Daltot Cottage, Loch Sween, *G. C. Adeney*.

Polygala serpyllacea Weihe. Kilmichael of Inverlussa.

**Spergula sativa* (Bœnn.). Cultivated field south of Kilmichael of Inverlussa.

**Agrimonia odorata* Mill. Port Lunna and on Fairy Isles, both on Loch Sween.

Apium graveolens L. Shore at head of Loch Sween.

Galium boreale* L. Between Lochan Laraiche and Loch Clachaig, *G. C. Adeney*.—G. erectum* Huds. Kilmichael of Inverlussa.

**Valeriana Mikanii* Syme (confirmed by W. H. Beeby). Kilmichael of Inverlussa.

Lobelia Dortmanna L. Lochan Taynish.

**Euphrasia curta* Fries, var. *glabrescens* Wettst. Shore of Loch Sween at Kilmichael of Inverlussa.

Lamium intermedium Fries. Cultivated land near Castle Sween.

**Polygonum amphibium* L. var. *terrestre* Leers. Kilmichael of Inverlussa.

**Cephalanthera ensifolia* Rich. Near Fairy Isles, Loch Sween, *W. E. Nicholson*.

Sparganium affine* Schnizl. (confirmed by W. H. Beeby). In a stream and in a loch on hills east of Daltot Cottage, Loch Sween. —S. minimum* Fries (confirmed by W. H. Beeby). Lochan Taynish.

Potamogeton alpinus Balb. Lochnam Ban.

**Ruppia rostellata* Koch, var. *nana* Syme. Creeping in the mud, covered by shallow water, at the head of Loch Sween, abundant. The length of the fruit-stalks varies considerably, from barely the length of the fruit to quite three times as long. These short-stalked forms remind one of *R. brachypus* Gay, which, however, is a delicate, lax plant, and does not root along in the mud. M. Gay, in Cosson's *Notes Critiques*, p. 10 (1848), points out that his *brachypus* has club-shaped filaments, woody and very hard pericarps, and fruit-stalks "scarcely the length of the fruit, not much longer and up to ten times" (distinguishing it from *rostellata*), and short peduncles which are never spirally coiled (distinguishing it from *spiralis*). He also asserts that the shape of the fruit in true *rostellata* varies from ovoid and regular to very oblique and long rostrate; so no importance can be attached to this character.

Zostera marina L. and var. **angustifolia* Fries. Shore of Loch Sween, near Kilmichael of Inverlussa. — **Z. nana* Roth. With *Ruppia nana* at the head of Loch Sween.

Carex paniculata L. Near Fairy Isles, Loch Sween.—*C. rostrata* Stokes. Lochan Taynish.

THE EUROPEAN SPHAGNACEÆ

(AFTER WARNSTORF)

By E. Charles Horrell, F.L.S.

(Continued from p. 258.)

§ II. Sphagna squarrosa Schimp. p. p.

A small section containing only two European species. Stem-cortex having small pores, the superficial layer on the outer surface with one, more rarely two membrane-thinnings, which are sometimes completely reabsorbed, forming true pores. Branch-leaves generally squarrose; hyaline cells with very large pores and more or less papillose on the inner wall where united to the chlorophyllose cells. Chlorophyllose cells in section triangular to trapezoid, inserted between the hyaline cells on the outer surface of the leaf, and free either on the outer only or on both surfaces. Stem-leaves large, lingulate, rounded and fimbriate above.

12. *S. squarrosum* Pers. apud Schrad. in Journ. Bot. 1800, 398.

Syn. *S. teres* var. *squarrosum* Warnst. in Die Europ. Torfm. 1881, 121.

Exsicc. Braithw. Sphagn. Brit. Exsicc. No. 26 (1877).

Plants very robust, equalling *S. cymbifolium* in stature. Tufts loose, deep, glaucous-green. Stems 10–20 cm. long, firm and rigid.

Wood-cylinder sometimes greenish, generally reddish or red.

Stem-cortex thin-walled, 2–3-layered, always clearly differentiated from the wood-cylinder. Pores on the inner walls small and few, on the outer surface of the superficial layer with a single membrane-thinning on each cell, more rarely with a distinct pore. Stem-leaves large, lingulate, fimbriate on the whole of the large rounded apex; cell-membranes in the upper part resorbed on both sides, and non-fibrillose; generally more or less fibrillose and porose near the base; border narrow and of equal width throughout.

Fascicles of 4–5 ramuli, of which 2–3 are spreading, robust, and attenuated at the apex. *Branch-leaves* generally in the upper half strongly squarrose, more rarely erecto-patent or imbricate; wide-ovate, concave, narrowly bordered, suddenly narrowed above into a lanceolate apex with inrolled margin; pores very numerous on both surfaces; on the inner surface in the upper two-thirds for the most part in the cell-angles, in the lower part near the lateral margins; on the outer surface in the basal part with very large,

round numerous pores on the commissures, in the upper part with scattered pores in the upper cell-angles, which are more numerous towards the lateral margins.

Chlorophyllose cells in section sometimes triangular and inserted on the outer surface of the leaf, but generally more or less medianly placed and free on both surfaces; in the upper part of the leaf both kinds of cells are of equal height, so that the hyaline cells are biplanar and the chlorophyllose cells have the free outer walls strongly developed; in the lower part the chlorophyllose cells are much smaller, so that the hyaline ones are biconvex.

Monoicous; male branches at first shortly clavate, becoming later uniformly elongated in the whole antheridium-bearing part; yellowish-green; perigonial bracts smaller than the leaves of the sterile branches, curved erecto-patent, non-fibrillose in the middle part of the lower half of the leaf. Perichætial bracts formed of both kinds of cells, in the lower part not rarely fibrillose and with small pores. Capsule frequent long-stalked, in or near the capitulum. Spores yellow, 25 μ in diameter.

Hab. Near boggy springs and the sides of moorland streams.

Distrib. Common in Europe and North America; Asia; Africa.

S. squarrosum is distinguished from *S. teres* by the greater robustness of all its parts, by the monoicous inflorescence, and by the form of the male branches and their perigonial bracts. The papillæ on the inner walls of the hyaline cells of the branch-leaves are as variable as those in the leaves of *S. papillosum*, being sometimes distinct and numerous, sometimes faint and almost invisible.

(1) Var. *spectabile* Russ. apud Warnst. in Bot. Gaz. 1890, 224. Branch-leaves squarrose-spreading throughout.

Near Loch Garve, Ross (*Braithwaite*).

(2) Var. *subsquarrosum* Russ. apud Warnst. in Hedwigia, 1888, 274 (syn. var. *semisquarrosum* Russ. apud Warnst. in Bot. Gaz. xv. 1890, 224). Branch-leaves squarrose-spreading either in the lower part of the stem only, or in the middle part only, or in the upper part only, those of the remaining part of the plant appressed or erecto-patent.

Snowdon, Carnarvon (*Ley*).

(3) Var. *imbricatum* Schimp. Syn. Musc. Europ. ed. 2, 1876, 836. All the branch-leaves imbricate or erecto-patent, not squarrose.

Aldershot, Hants (*Sherrin*); Netherton, South Lancashire (*Wheldon*); Roseberry Topping, North-east Yorkshire (*Horrell*); Trelleck Bog, Monmouth (*Ley*).

13. S. TERES Angstr. apud Hartm. Skand. Fl. ed. 8, 1861, 417.

Syn. *S. squarrosum* var. *teres* Schimp. Entw. Gesch. Torfm. 1858, 64. *S. squarrosulum* Lesq. apud Moug. Nestl. et Schimp. Stirp. Crypt. vog.-rhen. fasc. xiv. No. 1305 (1854).

Exsicc. Braithw. Sphagn. Brit. Exsicc. Nos. 29, 30, 43, 44 (1877).

Tufts loose and soft, light green, with greater or less admixture of yellow or yellowish-brown; much less robust than *S. squarrosum*, resembling in size and habit *S. Girgensohnii*. Stems up to 20 cm. high.

Wood-cylinder red.

Stem-cortex in 3 or 4 (–5) layers of thin-walled cells; the inner walls with small pores; each superficial cell having a single pore on the outer surface near its upper end.

Stem-leaves large, more or less lingulate and of equal width throughout, fimbriate on the rounded apex; border very narrow below; hyaline cells frequently divided, non-fibrillose; cell-membrane resorbed to a considerable extent, below with large pores equalling the cell in width.

Fascicles crowded together; spreading branches horizontal or erecto-patent; leaves generally closely imbricated round the stem, or in part erecto-patent, rarely the upper half squarrose; lanceolate; border very narrow. Pores on the branch-leaves very large and numerous; on the outer surface in the basal part arranged along the commissures, in the upper two-thirds with a single large pore in each upper cell-angle; on the inner surface in the upper two-thirds with numerous pores in all the cell-angles; hyaline cells on the inner surface where they are united to the chlorophyllose cells weakly papillose.

Chlorophyllose cells in section free on both sides of the leaf, in the upper part equal in height to the hyaline ones, below shorter, trapezoid, with the longer side on the outer surface.

Dioicous; generally male and female plants in separate tufts. Male branches brownish or dark green; at first shortly clavate, the thickened antheridium-bearing part not becoming elongated, and only the apex becoming flagelliform. Perigonial bracts differing little in size and form from the leaves of the sterile branches, but having the fibrils near the leaf-base very delicate or rudimentary. Perichætial bracts oval, large, obtuse and rounded, fimbriate on the upper margin; formed of two kinds of cells throughout; non-fibrillose and non-porose. Fruit rare, borne on elongated branches.

Hab. Deep marshy moors, boggy borders of lakes, &c., especially in sub-alpine districts.

Distrib. Widely distributed throughout middle and northern Europe; Asia; North America.

(1) Var. *imbricatum* Warnst. in Bot. Gaz. xv. 1890, 224. All the branch-leaves appressed or some of them erecto-patent, none squarrose.

Widdy Bank Fell, Teesdale, Durham (*Horrell*); Broadgate bog, Ings, Yorkshire (*Stabler*); Saltersgate bog, Yorkshire (*Boswell*); Skeggles, Westmoreland (*Stabler*); Strachan, Kincardine (*Sim*); Eskdale, North-east Yorkshire (*Anderson*).

(2) Var. *subsquarrosum* Warnst. in Hedwigia, 1888, 271. Branch-leaves in part appressed or erecto-patent, in part squarrose.

Widdy Bank Fell, Teesdale, Durham (*Horrell*); Skeggles, Westmoreland (*Barnes*).

(3) Var. *squarrosulum* Warnst. in Bot. Gaz. xv. 1890, 225 (syn. *S. squarrosulum* Lesq.). Branch-leaves squarrose-spreading throughout.

Knutsford Moor, Cheshire (*Wilson*).

§ III. Sphagna cuspidata Schimp.

Leaves of the spreading branches small, of medium size, to very large, ovate, ovate-lanceolate, lanceolate or almost linear; above generally narrowly, more rarely broadly truncate and toothed or sometimes sharply acuminate. Border sometimes broader, sometimes narrower, at times very broad. Margin generally toothed in the upper part, sometimes throughout; either inrolled at the apex only or further down. Leaves when dry not rarely strongly undulate or with weak or more marked metallic lustre. Chlorophyllose cells in section triangular, triangular-oval, trapezoid to rectangular, generally inserted between the hyaline cells on the outer surface and always free here; on the inner surface either completely enclosed by the more convex hyaline cells or free here also, at times median. Hyaline cells fibrillose or not. Pore-formation very various. Cortical cells of the stem generally with thick walls and narrow lumina, very frequently not differentiated from the wood-cylinder; non-porose and non-fibrillose. Stem-leaves varying much in form and structure; spatulate, lingulate to triangular-lingulate or triangular to almost lanceolate, with or without pores and fibrils, generally with a wide border, much widened below. Colour of the tufts of various shades of green, yellow, brown, or brown-red, never purple. Generally dioicous.

The *Sphagna cuspidata* having been reinvestigated by Warnstorf since the publication of the general key in the April number of this Journal, and the number of European species now recognized by him having been increased from eight to sixteen, a new clavis to the section has become necessary. This Dr. Warnstorf has been good enough to send: it is translated below, and should replace that portion of the original clavis which comes under paragraph 12.

§ III. *Sphagna cuspidata* Schimp.

(Revised clavis after Warnstorf, *in litt.*, May, 1900.)

I. Br. l. lanceolate, toothed on the narrowly or broadly truncate apex, rarely on the lateral margins; when dry generally more or less undulate 2

1. Br. l. small, ovate or longly-ovate, with very short, narrowly truncate and small-toothed apex; never toothed on the narrowly bordered margin, which is inrolled almost to the base, so that the leaf is very concave; when dry never undulate. Plants very delicate and soft
xxix. *S. molluscum* Bruch.

2. St. l. widened above, spatulate, and, in consequence of the resorbtion of the cell-membranes in the upper half on both sides of the leaves, fimbriate on the broadly-rounded apex; non-fibrillose . . . . xiv. *S. Lindbergii* Schimp.

2. St. l. triangular-lingulate, in consequence of the resorbtion of the cell-membranes of the wider hyaline cells at the apex only, here fimbriate and deeply two-cleft; non-fibrillose . . . . . xv. *S. riparium* Angstr.

2. St. l. isosceles- or equilateral-triangular, acute or obtuse

and toothed, on account of the rounded and somewhat fimbriate apex frequently triangular-lingulate, but never deeply cleft; with or without fibrils 3

3. Chlor. cells of br. l. in sect. everywhere trapezoid or rectangular to almost quadrate, and free on both surfaces of the leaf 4

3. Chlor. cells of br. l. in the basal half of the leaf, equilateral- to isosceles-triangular and completely enclosed by the hyaline cells on the inner surface of the leaf 6

4. Stem-cortex clearly differentiated from the wood-cylinder . 5

4. Stem-cortex not clearly differentiated from the wood-cylinder and hence apparently absent. Br. l. bordered with 3–4 rows of cells, margin entire, resembling in form those of *S. recurvum*; on the inner surface either almost entirely without pores or with few to numerous large, non-bordered pores; on the outer surface either only with small pores in the upper cell-angles or besides these in the basal half towards the margins with numerous larger pores. St. l. rather large, isosceles-triangular, toothed on the truncate apex; border not or scarcely widened below; generally fibrillose in the upper half of the leaf
xvi. *S. fallax* Warnst.

5. Br. l. bordered with 4–5 rows of narrow cells, margin entire, from a broad ovate base gradually narrowed to the broadly truncate and toothed apex, pores absent on both surfaces; branches generally single, frequently much elongated and again branched . xvii. *S. monocladum* Warnst.

5. Br. l. bordered with 5–6 rows of cells, margin entire, owing to the widely inrolled margin almost tube-like in the upper part of the leaf; on the inner surface in the upper half with smaller or larger non-bordered pores in the cell-angles; on the outer surface with small pores in the upper cell-angles only. Branches in fascicles
xviii. *S. cuspidatum* Warnst.

5. Br. l. distinctly dentate on the lateral margins, otherwise like *S. cuspidatum* . . . . . xix. *S. trinitense* C. Müll.

5. Br. l. bordered with 4–6 rows of cells, margin entire, very frequently more or less secund; pores on the inner surface almost absent or very few; on the outer surface, on the contrary, very numerous in the middle of the cell-wall or especially in the lower half of the leaf in two rows near the commissures; towards the apex not rarely with membrane gaps; all the pores are weakly or not bordered, but with distinct contour
xx. *S. Dusenii* Russ. & Warnst.

6. Chlor. cells in section generally only about half the height of the hyaline cells, the latter having their walls united together for some distance on the inner surface of the leaf 7

6. Chlor. cells of almost the same height as the hyaline cells,

and hence the latter are not united together on the inner surface of the leaf for any appreciable distance . . . 8

7. Br. l. broadly lanceolate, bordered with 4–5 rows of cells and almost suddenly produced into a short, narrowly truncate and toothed apex, when wet usually distinctly five-rowed; pore formation as in *S. recurvum*. Stem-cortex generally clearly differentiated
xxi. *S. pulchrum* Warnst.

7. Br. l. very large, broadly lanceolate, tube-like, bordered with 6–8, rarely more, rows of cells; on the inner surface in the upper half with non-bordered pores in the cell-angles; on the outer surface almost exclusively with small pores in the upper cell-angles only. Stem-cortex clearly differentiated . . . . xxii. *S. Torreyanum* Sulliv.

7. Br. l. gradually acuminate, bordered with 3–4 rows of cells, not 5-ranked; on the inner surface almost entirely without pores; on the outer surface especially in the basal half of the leaf towards the lateral margins with very small non-bordered pores with ill-defined contours, which in the var. *Zickendrathii* alone are absent; stem-cortex not clearly differentiated from the wood-cylinder
xxiii. *S. obtusum* Warnst.

8. Br. l. on the outer surface with few pores 9

8. Br. l. on the outer surface with extremely numerous pores (as in *S. subsecundum*). Pores very small, in the upper half of the leaf strongly bordered (sometimes some of the pores are incompletely ringed) and arranged in rows on the commissures, and in part in the middle of the cell-wall 10

9. St. l. small equilateral-triangular to triangular-lingulate, almost always non-fibrillose. Br. l. almost always undulate; on the inner surface with rather large, non-bordered pores in the cell-angles; on the outer surface in the upper half of the leaf with small pores in the upper cell-angles only, towards the base near the lateral margins with a single or several larger pores. Border of 3–4 rows of cells; stem-cortex generally not clearly differentiated . . . . . xxiv. *S. recurvum* Warnst.

9. St. l. still smaller than in *S. recurvum*, equilateral-triangular to triangular-lingulate, generally non-fibrillose. Br. l. generally not at all undulate. Pores on the inner surface as in *S. recurvum*; on the outer surface in the apical half with small bordered (in part incompletely ringed) pores in the cell-angles or on the commissures, and in the basal half towards the lateral margins with large pores in the cell-angles only. Border and stem-cortex as in *S. recurvum*. The smallest forms of this species have a great resemblance in habit to *S. acutifolium*
xxv. *S. parvifolium* Warnst.

9. St. l. small, from a generally narrower base oval or lingulate to triangular-lingulate, generally fibrillose. Br. l.

frequently little or not at all undulate, not rarely secund; on the inner surface with large non-bordered pores between the fibrils in the middle of the cell-wall; on the outer surface with small bordered pores in the cell-angles, but also frequently towards the apex in short rows on the commissures; in the basal part towards the lateral margins with large pores in the upper cell-angles only. Border narrow. Stem-cortex distinctly differentiated. In the smaller forms by the softness of the tufts resembling *S. molluscum*. Frequently of a beautiful brown colour . . . . . xxvi. *S. balticum* Russ.

10. Br. l. on the inner surface almost entirely without pores, or only with very small, scattered bordered pores in the cell-angles of the upper part of the leaf
xxvii. *S. annulatum* Lindb. fil.

10. Br. l. over the entire inner surface with numerous large, non-bordered pores . . . . xxviii. *S. Jensenii* Lindb. fil.

14. S. Lindbergii Schimp. Entwicklungsgesch. 67, pl. 25 & 27, fig. 47 (1858).

Exsicc. Braithw. Sphagn. Brit. Exsicc. No. 45.

Plants very robust or more delicate; when growing in water green throughout, otherwise brown, or, especially in the capitulum, dirty violet.

Wood-cylinder generally brown, more rarely green.

Stem-cortex 3–4-layered; always clearly differentiated from the wood-cylinder; cells of medium width, gradually thinner walled from within outwards, non-porose.

Stem-leaves large, bent backwards along the stem; from a narrower base widened above; fimbriate on the broad-rounded apex, and also at times on the lateral margins in the upper part. Border much widened below. Hyaline cells becoming gradually shorter and wider towards the apex; the uppermost rhomboid and several times septate; in the apical half and above the base in the middle of the leaf with the wall reabsorbed on both sides; slightly fibrillose above the base only. Stem-leaves in structure and form very closely resembling those of *S. fimbriatum*.

Fascicles consisting of 4–5 branches, sometimes distantly, sometimes more closely to very densely arranged; generally with two stronger spreading branches, the others, only a little weaker, being pendent; spreading branches drepano-, homalo-, or ano-cladous, with the leaves sometimes loosely, sometimes densely arranged all round the stem; leaves from the two kinds of branches not differing in size.

Branch-leaves ovate-lanceolate, toothed on the narrowly truncate apex, with rather wide border; margin inrolled only at the apex; when dry not or but little undulate, but with a distinct metallic lustre; frequently distinctly arranged in five rows. Hyaline cells with numerous fibrils; on the inner surface, especially in the apical half, sometimes with numerous, sometimes with few, round, non-bordered pores in each cell-angle; more rarely the pores are

almost entirely absent; on the outer side generally only with very small pores in the upper and lower cell-angles, towards the apex at times with scattered ringed pores in the lateral angles of the cells and in the middle of the leaf towards the lateral margins with a few larger pores, which, in some cases, exactly cover the pores on the inner surface.

Chlorophyllose cells in section triangular-oval, inserted between the hyaline cells on the outer surface of the leaf and here free; on the inner surface completely enclosed by the hyaline cells, which are united together for some distance; hyaline cells almost flat on the outer and strongly convex on the inner surface.

Polyoicous; antheridia borne on both spreading and pendent branches; male branches in the antheridium-bearing part generally rather darker brown, later becoming elongated at the apex; perigonial bracts differing much from the sterile leaves; small, ovate, with very short, truncate, finely-toothed, suddenly narrowed apex. Border wide all round; the rhomboid hyaline cells of the apical part here and there septate and with fibrils, but with few pores; in the basal half non-fibrillose. Perichætial bracts very large, plicate, from a narrower base widened above; fimbriate on the broadly truncate apex, as in the stem-leaves; in the basal part composed of chlorophyllose cells only, in the upper part of both kinds of cells and having the walls of the hyaline cells reabsorbed on both sides. Spores 23 μ in diameter, papillose.

Hab. Deep mountain bogs in northern and alpine regions.

Distrib. Europe; Lapland, Finland, Scandinavia, Scotland, Shetland, Silesia, Alps of Salzbourg and Styria; numerous localities in North America. Ben Wyvis, Ross-shire (*McKinley*); Unst Shetland (*Sim*).

S. Lindbergii is clearly distinguished from the other species of the section by the structure of the stem-leaves, which closely resemble those of *S. fimbriatum*; the British specimens are much smaller than those from more northern continental localities.

There are three main varieties, based upon the size of the branch-leaves:—

(1) Var. *macrophyllum* Warnst. in Europ. Torfm. No. 359 (1894), with very long and wide branch-leaves.

(2) Var. *mesophyllum* Warnst. in *l.c.*, with the branch-leaves of medium size, about 1·5 to 1·6 mm. long and ·57 mm. wide.

(3) Var. *microphyllum* Warnst. in Hedwigia, 1893, 11, with the branch-leaves very small, about ·86 mm. long and ·43 mm. wide. This variety closely resembles in general habit and colour a dense and short-branched form of *S. fuscum*.

15. S. RIPARIUM Angstr. in Öfvers. V. Ak. Handl. 21, 198 (1864).

Syn. *S. intermedium* var. *riparium* Lindb.; *S. cuspidatum* var. *speciosum* Russ.; *S. speciosum* Klinggr.; *S. spectabile* Schimp.

One of the handsomest and most stately species of the genus.

Plants generally very robust, more rarely delicate and weaker, when growing in the shade green throughout, in more exposed habitats pale and often a beautiful yellow in the capitulum.

Wood-cylinder thick, whitish or yellowish.

Stem-cortex absent or in 2–4 layers, which are clearly differentiated from the wood-cylinder, and are formed of more or less thick-walled, non-porose cells.

Stem-leaves large, bent backwards along the stem, triangular-lingulate to lingulate, fimbriate and deeply cleft at the rounded apex by reabsorption of the uppermost wide hyaline cells; border broad, much widened below; always non-fibrillose.

Fascicles sometimes distant, sometimes closer, of 4–5 branches; spreading branches long to very long, or shorter, either drepano-, homalo-, or ano- to ortho-cladous.

Branch-leaves large, broadly ovate-lanceolate, long and narrowly acuminate; finely toothed at the narrowly truncate apex; margin inrolled only at the apex; border narrow; when dry more or less undulate and with slightly recurved apex; metallic lustre less marked than in *S. Lindbergii*. Inner surface in the apical half either with large or small non-bordered pores, in part in the cell-angles, in part in the middle of the cell-wall; towards the lateral margins, in the middle and the basal part of the leaf with scattered or numerous large membrane-gaps in the upper cell-angles. These are entirely or in part immediately opposite corresponding membrane-gaps on the outer surface of the leaf. On the outer surface almost always only with small pores in the upper or upper and lower cell-angles; more rarely also with small pores in rows on the middle of the cell-wall; in this last case the pore structure closely resembles that of *S. obtusum*. Membrane-gaps in the upper cell-angles of the leaves of the pendent branches always numerous, and equal to one-third to one-half the cell-wall in extent; frequently in the whole apical half of the leaf with larger or smaller non-bordered pores, which have often a very indistinct outline.

Chlorophyllose cells in section generally parallel-trapezoid, more rarely triangular, inserted between the hyaline cells on the outer surface of the leaf and here free; on the inner surface generally not enclosed by the hyaline cells; these are almost flat on the outer surface and strongly convex on the inner.

Dioicous; male branches in the antheridium-bearing part pale brownish, later becoming elongated at the apex; perigonial bracts differing considerably from the sterile leaves; from a narrower base widened above and then almost suddenly narrowed into a short apex; border narrow below, much wider above; hyaline cells in the basal part generally quite without fibrils and in the entire leaf, on both surfaces, without pores. Perichætial bracts broadly-oval, for the greater part composed of chlorophyllose cells only; in the upper half with scattered narrow, vermicular, hyaline cells, which are always non-fibrillose and non-porose.

Hab. Most frequent in deep moorland pools, frequently submerged, but sometimes also in drier habitats.

Distrib. Europe; Austria, Germany, Russia, Finland, Lapland, Scandinavia, Denmark, France, Britain (?); Asia; North America.

The very numerous forms of *S. riparium* are grouped by Russow in Archiv Naturk. Liv. Est. & Kurl. Ser. ii. Bd. x. Lief. 4, 1894,

in two sections—(1) § *platyphylla* with short and wide stem-leaves, and (2) § *stenophylla* with elongated and narrow stem-leaves. The section *platyphylla* is divided into two sub-sections—(1) *sparsifolia* with the branch-leaves loosely arranged and undulate, and sub-section (2) *densifolia* with the branch-leaves closely arranged and less undulate.

16. S. FALLAX Klinggr. in Topogr. Fl. v. Westpreussen, 1880, 128.

Hydrophilous. In green submerged tufts; when dry resembling in habit a rather robust *S. recurvum*.

Stem-cortex not clearly differentiated from the wood-cylinder, and hence apparently absent.

Stem-leaves rather large, narrowly isosceles-triangular or broadly triangular, and produced above into a more or less suddenly contracted, longer or shorter, narrowly truncate and toothed apex; in this case ·9–1·1 mm. wide at the base, and 1·1–1·46 mm. long. Border not or scarcely widened below. Hyaline cells narrow and vermicular, somewhat shorter and wider above, rarely septate; generally fibrillose in the upper one-third to one-half; on the inner surface with large round non-bordered pores between the fibrils; on the outer surface, on the contrary, with very small pores in the upper cell-angles only; more rarely non-fibrillose, and then the pores on the inner surface are almost entirely absent.

Fascicles with generally four branches, of which the two stronger are spreading and are long and tapering, the others are pendent. *Leaves* of both kinds of branches similar in form and pore-formation, but those of the pendent branches smaller. Leaves of the spreading branches when dry rather strongly undulate, those of the branches in the capitulum not rarely almost squarrose, resembling very closely in form those of *S. recurvum*; broadly lanceolate, ·7 mm. wide and 1·3–1·52 mm. long; margin inrolled towards the narrowly truncate and toothed apex; border 3–5 cells wide and entire. Hyaline cells with numerous fibrils; on the inner surface either almost quite without pores or with few to numerous large non-bordered pores, as in *S. recurvum*; on the outer surface either with small pores in the upper cell-angles only, as in *S. cuspidatum*, or besides these in the basal half of the leaf towards the margin with larger pores, which are frequently several together in each cell, as in *S. recurvum*.

Chlorophyllose cells in section broadly trapezoid, similar to those in *S. cuspidatum* and free on both surfaces, or some of them triangular and then enclosed on the inner surface by the more convex hyaline cells, as is the usual case with *S. recurvum*.

Hab. Submerged in swampy pools.

Distrib. Germany; Russia.

S. fallax occupies a somewhat middle position between *S. recurvum* and *S. cuspidatum*, but is rather more nearly related to the former. It is distinguished from *S. cuspidatum* by the absence of stem-cortex, the border of the stem-leaves, and by the form of the branch-leaves; from *S. recurvum* by the larger stem-leaves which have the border of equal width all round and are fibrillose in the

upper half or more, and by the chlorophyllose cells of the branch-leaves, which are generally trapezoid in section.

17. S. MONOCLADUM Warnst. in Bot. Centralbl. lxxxii. 1900, 70.

Syn. *S. cuspidatum* var. *monocladum* Warnst.

Plants resembling a *Harpidium* in habit; grey- or yellow-green; completely submerged as in *S. cuspidatum* var. *plumosum*, and reaching 20 cm. in length; the entire stem bearing branches, which are usually singly arranged (not in fascicles); branches becoming regularly shorter towards the apex of the stem, at the base the branches as much as 13 cm. long, and again branched and terminating as do the main stems in small capitula.

Cortex of the thin stems generally one-layered, cells wide and clearly differentiated from the wood-cylinder.

Stem-leaves large, about 3 mm. long and 1·2 mm. wide, ovate-lanceolate, apex widely truncate and with 5–8 teeth; border of equal width throughout; the narrower and longer hyaline cells are non-porose and not always fibrillose, and are frequently divided by a cross-wall; frequently two or more chlorophyllose cells adjoin one another.

Branch-leaves very large, 4–5 mm. long and about 1·2 mm. wide, from a broadly ovate base gradually produced into a broadly truncate and toothed apex; border of 4–5 rows of narrow cells; margin entire; when dry undulate. Cell-formation as in the stem-leaves; the cell-membrane of some of the leaves deeply plicate; non-porose on both surfaces.

Chlorophyllose cells in section rectangular, centric, with the wall of equal thickness all round; enclosed by the biplanar hyaline cells on neither surface, and with the free walls generally somewhat convex.

Distrib. Germany.

18. S. CUSPIDATUM Russ. & Warnst. in Sitzungsber. d. Dorpater Naturforscher-Ges. 1889.

Exsicc. Braithw. Sphagn. Brit. Exsicc. nos. 50-52.

Plants generally completely submerged in water; sometimes robust, sometimes delicate; varying in habit; green, whitish, yellow-green or brownish; soft or rather rigid.

Wood-cylinder generally whitish, more rarely yellowish or pale reddish.

Stem-cortex almost always clearly differentiated, of 2-3 layers of more or less thick-walled non-porose cells. Cells of the medulla rarely with rudimentary fibrils.

Stem-leaves large, isosceles-triangular, apex generally narrowly truncate, and toothed, and with inrolled margin; border broad and generally much widened below, more rarely of almost equal width throughout; hyaline cells in the apical part and at times also lower down with fibrils and numerous membrane-gaps on the inner side; only towards the base divided by oblique cross-walls.

Fascicles, according to the habitat, more remote or closer together, generally with four branches, all of which are more or less spreading; the more pendent ones but little weaker than the others. *Branch-leaves* generally long lanceolate-subulate,

toothed at the broadly truncate apex; margin generally widely inrolled, and hence the leaf is more or less tubular. Border 5–6 cells wide, entire; when dry not, weakly, or strongly undulate; without metallic lustre; never arranged in five rows; loosely or closely imbricate; frequently secund. Hyaline cells strongly fibrillose, the fibrils projecting considerably into the cell; only in undeveloped water-forms frequently non-fibrillose, and then at times the chlorophyllose cells predominate. Pores on the inner surface in the upper half of the leaf larger or smaller non-bordered, situated in the cell-angles; on the outer surface always with only very small pores in the upper cell-angles.

Chlorophyllose cells in section trapezoid, inserted between the hyaline cells on the outer surface of the leaf, and free on both surfaces; hyaline cells almost flat on the outer surface, more convex on the inner.

Dioicous; male branches in the antheridium-bearing part rust-coloured; perigonial bracts not differing from the sterile leaves. Perichætial bracts very large, broadly ovate, produced above into a truncate and toothed apex; in the lower third generally composed of chlorophyllose cells only, above of both kinds of cells which towards the margin gradually pass over into the wide border; hyaline cells in the apical part generally with fibrils and large pores on the inner surface. Capsule comparatively small.

Hab. Very common, especially in moorland pools.

Distrib. Throughout Europe; Africa; N. America; S. America; Australia.

The following are the main varieties:—

(1) Var. *falcatum* Russ. Beitr. 1865, 59. Habit varying according to the habitat; when completely submerged or with the capitulum alone above water, elongated and robust; when growing on the borders of moors and swamps, shorter and more delicate; colour various, dark- or grey-green, yellow-green, or brownish. Fascicles distant or closer together, generally with four branches, of which the pendent branches are but little weaker, and spread at an acute angle from the stem; branches falcate; branch-leaves narrowly or broadly lanceolate, toothed on the rather broadly truncate apex; margin widely inrolled; when dry either undulate or almost straight, falcate.

Keston Common, Kent (*Horrell*); Witherslack Bog, Cheshire (*Ley*); Llwchyr, Carmarthenshire (*Ley*); Widdy Bank Fell, Teesdale, Durham (*Horrell*).

(2) Var. *submersum* Schimp. Hist. Nat. des Sph. 1858, 68. Plants submerged or with the upper part above water; light green, or a dirty dark green, or with the capitulum brownish; delicate and slender or more robust. Fascicles distant. Branches all more or less spreading, the stronger curved downwards or almost upright and rigid; sometimes more, sometimes less tapering at the apex; leaves when dry not at all or only at the base of the branches weakly undulate, generally appressed or upright, not falcate. This variety is intermediate between the var. *falcatum* and the var. *plumosum*.

Widdy Bank Fell, Teesdale, Durham (*Horrell*); Foulshaw Moss (*Ley*); Whixall Moss, Salop (*Ley*); Trelleck Bog, Monmouth (*Ley*).

(3) Var. *plumosum* Nees & Hornsch. Bryol. Germ. 1823, i. 24. Completely submerged; colour sometimes lighter, sometimes darker green. Fascicles close or distant, all the branches almost equally spreading from the stem. Branch-leaves very longly subulate, border broad, toothed at the frequently widely-truncate apex; chlorophyllose cells at the apex, and at times also in the remainder of the leaf, predominating, and the hyaline cells then only in part with fibrils; when dry, rigid and erecto-patent, not undulate.

Scotstown Moor, Old Machar, Aberdeen (*Sim*); Widdy Bank Fell, Teesdale, Durham (*Horrell*); Trelleck Bog, Monmouth (*Ley*).

(To be continued.)

NOTES ON RHUS.

By James Britten, F.L.S.

Rhus javanica L. Sp. Pl. 265 (1753). This plant is generally regarded—*e. g.* by such writers as Engler, Bretschneider, Hemsley, etc.—as identical with that generally known as *R. semialata* Murr. Linnæus's brief character runs: "Rhus foliis pinnatis ovatis acuminatis serratis, subtus tomentosis. Habitat in Java. Osbeck." The locality is altered to "China" in Sp. Pl. ed. 2, no doubt correctly, as Osbeck (*Dagbok Ostind. Resa*, p. 232 (1737)) enters in his diary under Sept. 27, 1751, as "*Rhus javanica*, germine rubro. Chin. Taj-scha." In the Linnean Herbarium *R. javanica* is represented by two sheets; the first, bearing the name and number (2) in Linnæus's hand, is *Brucea sumatrana*; the second, not named but similarly numbered, is practically identical with *R. Buki-Amelam* Roxb. (*R. Amela* D. Don), which is generally considered a form of *R. semialata*.

In his diary (*l. c.*) Osbeck has also "*Rhus chinensis* blommade wid graswarna och tallades af Chineserna *Monchi*"; this is also identified by Bretschneider with *R. semialata*. The name was adopted (apparently by coincidence) by Philip Miller (Gard. Dict. ed. viii. no. 7 (1768)), who cites as a synonym "Rhus Sinarum lactescens, costâ foliorum alatâ. Pluk. Am. 183." Plukenet's specimen is in his herbarium (Herb. Sloane xciv. f. 67) and two sheets from Miller's herbarium are in Herb. Banks: all these represent the form of *R. semialata* having conspicuously winged petioles.

The only author who seems to have been aware that Linnæus had two plants in view is, so far as I know, R. A. Salisbury, who in his *Prodromus* (p. 171) cites *R. javanica* L. as a synonym of his *Ailanthus gracilis* (= *Brucea sumatrana*). We have a specimen of *A. gracilis* from Salisbury's garden, 1785, written up: "Rhus javanica of Linné: an vere hujus generis?"

De Candolle (Prodr. ii. 67) takes the Linnean plant (as described) as the type of his variety *Osbeckii* and bases his var. *Roxburgii* (sic)

on Roxburgh's *R. Bucki-Amelam*; *R. chinensis* Mill. he retains as a distinct species. Prof. Engler (in DC. Mon. Phan. iv. 380) retains these varieties, and adds a short diagnosis of each—"petiolis inter juga late alatis," for *Osbeckii* (under which he places *R. javanica* L.) and "petiolis inter juga angustissime alatis vel exalatis" for *Roxburghii*, under which he puts *R. chinensis* Mill. The specimen of *Rhus* representing *javanica* in Linn. Herb. has exalate petioles, while in those of Plukenet and Miller the petioles are distinctly (in Miller's very conspicuously) winged, and they are so described in Gard. Dict.

I am inclined to think that the original name of Linnæus should be retained for the species; his diagnosis, though brief, is accurate so far as it goes, and is supported by one of the specimens representing the plant in his herbarium. If, however, on any ground this should be set aside, there is no reason against the adoption of *R. chinensis* Mill., which considerably antedates *R. semialata* Murr. The synonymy is:—

R. JAVANICA L. Sp. Pl. 265 (1753) & Herb. in part; Osbeck, Ostind. Resa, 232 (1757).
R. chinensis Osbeck, *l. c.* (nomen).
R. chinensis Mill. Gard. Dict. ed. viii. n. 7 (1768) (*chinense*).
R. semialata Murr. in Comm. Gotting. vi. 27, t. 3 (1784) et auct. plur.

The date of introduction of the species is given in Hort. Kew. (iii. 490) as 1780, but Miller grew it at Chelsea before 1768 and there are specimens in Herb. Banks labelled "Hort. Busbridge* e seminibus chinensibus 1761"; in these the wings of the petiole are much reduced. Banks had also a native specimen from "China, Wampo, Mr. Robertson, gathered Novemb. 1772."

The Hongkong plant referred to *R. semialata* by Hance (Journ. Linn. Soc. xiii. 101) is not that species, and is probably, as Mr. Hemsley (*l. c.* xxiii. 147) suggests, a variety of *R. hypoleuca* Champ. Hance's specimen (which Mr. Hemsley does not appear to have seen) is fragmentary, but differs from typical *hypoleuca* by its serrated leaves.

RHUS INCANA Mill. Gard. Dict. ed. viii. no. 8 (1768) (*incanum*). For this Miller cites Pluk. Phyt. tab. 219, fig. 8. Plukenet's specimen is in Herb. Sloane xcvii. fol. 155 and is *R. villosa* Linn. f. Suppl. 183 (1781). Miller's name, which of course has priority, is not cited by Engler in his Monograph (DC. Mon. Phan. iv. (1883)); but that author (*l. c.* 428) assigns the same name to a South African species, which I propose to call R. ENGLERI. The names will stand:

R. INCANA Mill. Dict. ed. viii. no. 8 (1768).
R. villosa Linn. f. Suppl. 183 (1781).
R. ENGLERI.
R. incana Engl. in DC. in Mon. Phan. iv. 428 (1883), non Mill.

* Elsewhere in Herb. Banks cited as "Hort. Dni. Ph. Carteret Webb ad Busbridge." Webb was the great-grandfather of the botanist Philip Barker Webb; he lived at Busbridge (near Godalming) from 1748 until his death in 1770.

Rhus lucida Ait. Hort. Kew. ed. 2, ii. 166 is referred in *Index Kewensis* to *R. mucronata* Thunb. Sonder (in *Flora Capensis*) follows De Candolle in referring Aiton's var. *a* to *R. mucronata* Thunb. var. *Burmanni* and in retaining Aiton's var. *β* under *lucida*. Prof. Engler refers Aiton's *lucida* both to *lucida* L. and *mucronata*, without in either case specifying which form he intends.

Toxicodendron arborescens Mill. Dict. ed. viii. no. 9 is rightly identified in Ind. Kew. with *Rhus arborescens* DC., which is based upon it. But Mr. Jackson retains *R. arborescens* as a species, whereas Miller's plant was identified by Triana and Planchon (in Ann. Sc. Nat. 5th ser. xiv. 321), on the faith of specimens from Forsyth (who succeeded Miller at Chelsea) at Kew, with *Amyris sylvatica* Jacq.—a determination borne out by Miller's own specimens from Carthagena in Herb. Banks.

Toxicodendron glabrum Mill. Dict. ed. viii. no. 3 is made a synonym of *Rhus glabra* in Ind. Kew. The character "foliis ternatis" is sufficient to show that this cannot be the case; we have not Miller's specimens, but the figure he quotes from Hort. Elth. represents *R. radicans*.

"Toxicodendron magnum" quoted in Ind. Kew. as of "Bertram ex Steud. Nom. ed. ii. ii. 694" seems to have originated in a remark of Miller's under his *T. serratum*, which he says "was sent me by Mr. John Bartram by the title of Great Toxicodendron." *T. serratum* was doubtless a form of *R. Toxicodendron*.

"Toxicodendron triphyllum Mill. Dict. no. 5" quoted by Engler (DC. Mon. Phan. iv. 385) as a synonym of *R. suaveolens* Ait. is not to be found in Miller; presumably *T. crenatum* Mill., which bears the number cited, is intended.

ARTEMISIA STELLERIANA IN IRELAND.

By Nathaniel Colgan, M.R.I.A.

In an article printed in the April issue of this Journal, from the February number of *Rhodora*, Mr. M. L. Fernald has drawn attention to the rapid spread of this Kamtschatkan alien on the New England sand-dunes. As it is now six years since the first appearance of this species in a naturalized state in Ireland was recorded in these pages (Journ. Bot. 1894, p. 22), the following notes on the behaviour of the plant during this period in its Irish station on the North Bull, Dublin Bay, may be useful as a supplement to Mr. Fernald's interesting paper.

The North Bull is a low sand-bank to the north of Dublin Bay, running for some three miles in a north-easterly direction and roughly parallel with the coast of the mainland, from which it is separated by a shallow tidal creek varying in breadth from a quarter of a mile to half a mile. The breadth of the bank itself varies within the same limits, and its outer or seaward edge is marked for

two-thirds of its length by a line of sand-dunes nowhere exceeding ten feet in height or a hundred yards in extension inland, and fixed by a luxuriant growth of *Psamma arenaria*. The greater part of the bank is quite low, and much of it is submerged at high tide.

On my first careful examination of the Bull in September, 1894, eight large patches of the *Artemisia* were found, distributed over a length of some six hundred yards, each patch being about a yard in diameter. All of the patches were confined to the dunes on the eastern or seaward side of the bank, none being observed at a distance of more than twenty yards inland from the seaward crest of the dunes, while one grew on the crest itself. In 1896 a perceptible increase of the plant was noticed, and in 1898 a still further increase, accompanied by a movement eastward or seaward, one patch having quite crossed the dunes and reached the beach outside, while another had gained the top of the crest. No further observation was made until June of this year, when the plant was found to have achieved a most remarkable extension of range, as well as increase of mass. Whereas previously the extreme length covered by the widely separated patches from south to north was some 600 yards, the range this year extended for fully a mile. At the same time the number of scattered patches was found to have increased to no less than 140, while in one spot the plant covered, almost continuously, a strip of beach 130 paces long by some three yards broad.

Quite as noticeable as the great increase of the plant was the general north-eastward drift it appeared to have made from the position occupied by the first settlement observed in 1894. The effect of this drift—using that word, of course, in a largely figurative sense—has been to transport the plant (all, save a few small patches) across the dunes to the sea-beach forming the eastern margin of the Bull. Having left behind it the zone of *Psamma arenaria*, it has invaded that of *Triticum junceum*, and, firmly established here, threatens soon to dispute with *Salsola* and with *Atriplex Babingtonii* and *A. farinosa* the possession of that final zone of terrestrial vegetation which lies immediately above tide-mark.

This north-eastward drift should, no doubt, be attributed to the influence of the prevailing west and south-west storm-winds. By these winds the brittle stems and shoots of the mature plants are torn off in late autumn and winter and carried eastward or north-eastward, to be buried in blown sand and form fresh points of growth and dispersion, while the more effete parent stocks are left behind to perish gradually. It would appear to be thus, rather than by seed-dispersion, that the increase or migration of the plant is effected, as I have so far observed no seedling plants on the sands.

If this hypothesis be well founded, it may be asked, is it not probable that in course of time the whole North Bull settlement of *Artemisia Stelleriana* will be swept off the sand-bank into Dublin Bay? The fact that the plant in its new position is sheltered by the sand-dunes from the prevalent storm-winds gives us reason to hope that it may retain a permanent hold on the North Bull, and this hope is strengthened by the history of its settlement on the

New England sands given us by Mr. Fernald. Whatever fate the future may have in store for this interesting alien, its present standing on the North Bull fully entitles it to a place in the flora of County Dublin.

SHORT NOTES.

Euphorbia Portlandica in Cheshire. — The locality given on p. 277, although well known, was omitted by some mistake from the *Flora of Liverpool* published by the Liverpool Naturalists' Field Club. It was, however, inserted in the Third Appendix (published in 1887), where it stands: "Abundant on the sandhills between West Kirby and Hilbre Point. First record of occurrence in the Cheshire portion of the district."—Robert Brown.

Schœnus nigricans in Somerset.—When botanizing, on July 9, in marshy ground near Winscombe with Mr. David Fry, I was fortunate enough to come upon a fair-sized patch of *Schœnus nigricans*. I did not realize its interest in connection with Somersetshire until Mr. Fry told me it was a rediscovery for the county. The plant was found many years ago between Clevedon and Portishead, but has in recent years been looked for in vain in that, its so far only known, locality in Somersetshire. It grows on a marshy piece of ground very much overgrown by alder bushes, &c. We searched in vain for other patches of the plant; but, owing to the character of the ground and its wide area, it is very difficult to examine it thoroughly.—**W. F. Miller.**

Plants new to Jersey. — On June 28th I found *Capnoides claviculata* growing sparingly, though over a fairly large area, on a hill-side near La Crète Point. This is the first record for the Channel Islands. — *Orchis pyramidalis* L. On July 8th I found on a sandy pasture in St. Ouen's Bay one specimen. A gentleman living close by, to whom I showed it, told me that four or five years ago he had found an *Orchis* near there which he now recognized as the same plant. This is also now first recorded for the Channel Islands.—Stanley Guiton.

Stratiotes aloides in the Isle of Wight.—During a short stay in the Isle of Wight last June, I paid some attention to the botany of Sandown and neighbourhood. In a pond on the borders of Lake Common, near the waterworks, I came across a luxuriant growth of *Stratiotes* in flower. The discovery was a great surprise, as I had more than once examined the pond in recent years and found nothing beyond *Equisetum*, *Iris*, and other common aquatics. The plant looks wild enough in the Sandown locality, and there is nothing to lead one to suppose that it has been introduced by human agency. There is no trace of it in the ditches adjoining the pond and in the meadow beyond. That the *Stratiotes* is not altogether a stranger in the island is shown from a note at p. 337 of Mr. Townsend's *Flora of Hants*, where he states that *Stratiotes*,

Villarsia, and *Hydrocharis* were naturalized in the Isle of Wight by Dr. Salter in a small pool at Barretts, about two miles from Ryde, on the Brading road. This locality, which I have not visited, can only be a few miles from Sandown, and it is possible that the appearance of the species at Lake may be accounted for by the fact of its having been introduced in some way from the old locality. This species, being only aboriginally wild in the eastern counties, has of course no claim to be considered indigenous in Wight, but its apparently spontaneous occurrence there seems worthy of record. I should be glad if any Isle of Wight botanist could furnish any information on the point. Near the Red Cliff, Sandown Bay, I found several plants of the beautiful *Lathyrus Nissolia*, not previously noted for South Wight.—A. Bruce Jackson.

NOTICES OF BOOKS.

Illustrations of the Botany of Captain Cook's Voyage Round the World in H.M.S. 'Endeavour' in 1768–71. By the Right Hon. Sir Joseph Banks, Bart., K.B., P.R.S., and Dr. Daniel Solander, F.R.S. With Determinations by James Britten, F.L.S., Senior Assistant, Department of Botany, British Museum. Australian Plants. Part I. London: Printed by Order of the Trustees of the British Museum. Sold by Longmans, &c. Large folio, pp. 31, 101 plates. 25s.

In these latter days justice is being done to the great naturalists who accompanied Capt. Cook in his first voyage round the world. The Journal of Sir Joseph Banks was four years ago given to the world under the editorial care of Sir Joseph Hooker, and now we have the first instalment of the Botany of the voyage, issued by the Trustees of the British Museum. A hundred and eighteen years have passed since the death of Solander, and eighty years since that of Banks, and only now the materials they left practically ready for the press begin to appear, under the careful and reverent editorship of Mr. Britten.

The first delay in publishing the results of the voyage arose, no doubt, from the occupation of Banks and Solander in preparing to join Cook in his second voyage, which they, however, in the end abandoned. Linnæus was distressed when he heard of their intended connection with this second voyage: "This report," he says, in a letter to Ellis, dated 22 Oct. 1771,* "has affected me so much, as almost entirely to deprive me of sleep. How vain are the hopes of man! Whilst the whole botanical world, like myself, has been looking for the transcendent benefits to our science from the unrivalled exertions of your countrymen, all their matchless and truly astonishing collection, such as has never been seen before nor may ever be seen again, is to be put aside untouched, to be thrust into some corner, to become perhaps the prey of insects and of

* *Correspondence of Linnæus*, i. 267.

destruction. I have every day been figuring to myself the occupation of my pupil Solander—now putting his collection in order, having first arranged and numbered his plants, in parcels, according to the places where they were gathered, and then writing upon each specimen its native country and appropriate number. I then fancied him throwing the whole into classes; putting aside, and naming, such as were already known; ranging others under known genera, with specific differences; and distinguishing by new names and definitions such as formed new genera, with their species. Thus, thought I, the world will be delighted and benefited by all these discoveries; and the foundations of true science will be strengthened, so as to endure through all generations!"

All this Solander had carefully done, but the publication which Linnæus longed for was delayed. After his companion's somewhat sudden death, Banks became more occupied with his duties at the Royal Society and the burthen of work that fell to him in promoting scientific research, so that the finished manuscripts of Solander and the engraved plates, prepared at great expense by Banks, remained unknown until to-day, save for the set of proofs in the Department of Botany and a few at Berlin and Kew, and the occasional reference to them in the works of systematic botanists.

No expedition more thoroughly equipped for scientific work ever left England. Three artists were on Sir Joseph Banks's staff, whose duty it was to make sketches from life of the natural objects of interest. The plant-sketches give a general impression of the habits of the plant figured; the flowers, one or two leaves, and a portion of the stem were carefully coloured, and the details of the flower then thought sufficient usually added. The botanical artist was Sydney Parkinson, who, as well as the others, died during the voyage; the finished drawings from which the plates were prepared had to be made by others from the sketches and the dried specimens. Of the hundred plates in this first instalment of the work, seventy-three were painted by Nodder, ten by John F. Miller, seven by John Cleveley, and four by James Miller; a few have no artist's name attached. Most of the finished drawings were engraved on copper in a necessarily somewhat severe style, scarcely doing justice to the drawings. Mr. Morgan, in the two drawings he has reproduced (24 and 26), which had not been engraved, gives a more happy rendering of the originals. Nevertheless the copper plates are faithful representations of the plants, few of which have up to this time been figured.

Mr. Britten's treatment of the letterpress deserves the highest commendation. He has first determined the name adopted for each plant, and has added, in chronological order, the synonyms, so far as these relate to the history of the plants in Australian botany. The nomenclature is in accordance with that adopted in the Museum publications, which regards as entitled to priority the name first published under the accepted genus, for which latter the earliest name published in or after 1753 is maintained. This has resulted in certain deviations from the nomenclature generally received, and in two or three new combinations. It must have been a great

temptation to him to give Banks and Solander the full credit of their systematic work by publishing the names they had given to the plants. They appear in Solander's manuscripts, which are fully accessible in the Botanical Department of the British Museum, and are written on the sheets of the National Herbarium. But their publication in this volume would have added to an already overburdened synonymy, and they have been wisely withheld. Solander's descriptions, however, are printed. They are exact and elaborate, and maintain Solander's reputation, being also a valuable contribution, even after all these years, to systematic botany. Then follow the localities where the plants were found by the explorers, taken from the Herbarium, and, when additional information is given, from the sketches made by Parkinson and others during the voyage.

Mr. Bentham, in his great work on the Flora of Australia, has quoted many of the Banks and Solander plants, but he has omitted many more, and, what is remarkable in one who was so careful, he has credited many of these earlier plants to Robert Brown. Mr. Britten has carefully indicated these omissions and errors in his appended notes, and has thus restored to the first investigators the credit of their discoveries, of which one can acquire no adequate knowledge from the pages of the Australian Flora. Notes of a more critical nature are added by the Editor when occasion requires.

One cannot but regret in turning over the pages that all this valuable information was not in the hands of the scientific world a century ago. It is, however, a happy circumstance that the editorial work is in the hands of Mr. Britten, whose sympathy with and knowledge of the labours of these earlier botanists are both extensive and exact. For financial reasons, the Trustees were unable to accede to my repeated applications for the production of these plates, and I congratulate my successor, Mr. Murray, on having been so fortunate as to secure the publication of this important addition to the works issuing from his Department.

WILLIAM CARRUTHERS.

CONGO PLANTS.

Plantæ Thomerianæ Congolenses. Par É. DE WILDEMAN et TH. DURAND. Large 8vo, cloth, pp. xx, 49, tt. 23. Price 8 fr. Bruxelles: Schepens.

Contributions à la Flore du Congo. [Same authors.] Vol. i. fasc. 2. Pp. 48. Bruxelles: Van de Weghe.

THE energy displayed by Belgian botanists in working out the botany of the Congo Free State is remarkable, but it may be hinted that their mode of publication is hardly the most convenient that could be adopted. At the present time, contributions to the subject are appearing in no fewer than three serial forms—for besides the 'Contributions' named above, we have the 'Illustrations,' a separate publication, and the 'Matériaux,' proceeding in the Bull. Soc. Royale de Bot. Then in 1896 we had the "première partie" of 'Etudes'

on the flora of the State, by MM. Durand and Schinz; and now we have an independent volume dealing with a special collection. Moreover, the fascicles of the 'Contributions,' although forming part of the same volume, are paged separately; and it would seem that a fifth publication will ultimately be needed, in the shape of a general index to the other four.

Apart from this criticism, we have nothing but praise for the work which is doing so much to enlighten us on the botany of West Africa, and especially for the handsome and singularly cheap volume in which M. Thonner's collections are figured and described. His expedition was made in 1896, in the Bangala district; and although he only collected 104 species, a fourth of these are new to science, while a similar number are new for the Congo region. M. Thonner contributes to the volume an account of his explorations, and the description of the species has been undertaken by MM. de Wildeman and Durand in conjunction with various botanists whose assistance is duly acknowledged. No new genus is described, but the authors call especial attention to the remarkable Euphorbiaceous plant *Pycnocoma Thonneri*, which has been again collected in the same district by a more recent traveller.

The most remarkable feature about the book is its cheapness. How twenty-three admirably executed plates, mostly of folio size, with accompanying letterpress and a map, and strongly bound in cloth, can be produced for the sum of eight francs, we do not understand. We welcome the contribution as a further and important addition to our knowledge of the African flora.

The new fascicle of the *Contributions à la Flore du Congo* contains descriptions of many novelties, principally of the genera *Rinorea*, *Cissus*, and *Urophyllum*. We note that it is dated April, but the copy sent to the Museum did not arrive until the beginning of July; while the first fascicle, dated July 1899, did not come to hand until September of that year. At a time when so many are publishing independently descriptions of new African plants, it is important that the dates given should be those at which the publications actually appear.

Lehrbuch der Pflanzenkrankheiten von Dr. Robert Hartig. 3rd ed. Berlin: Julius Springer. 1900. 8vo, pp. ix, 324; tab. i. figs. 280.

In its previous editions this book has been known to all concerned as a most admirable exposition of the diseases of trees. An English edition by Professors Somerville and Marshall Ward was published in 1894, and its usefulness and general trustworthiness became more widely recognized in this country and America. It is one of those books that are not only directly useful in themselves, but are used as mines into which many authors have dug more or less legitimately. I have read not a few "original" treatises which were principally Hartig with a few added facts. One can hardly praise a book more highly than that.

When a book has reached such a standing, it is generally well to let well alone. But we have happily an exception here. Prof. Hartig conceived the fortunate idea of expanding the third edition so as to make it a text-book of plant diseases. The number of illustrations is doubled, and the additions to the text are of course numerous. One cannot help in some cases feeling that some of these additions have been made in a perfunctory way. I find no intrinsic fault, least of all in a German book, with their admirable brevity, especially when accompanied by so many good figures. But in comparison with the original portions the additions are occasionally meagre. For example, a page and a half on the potato disease (*Phytophthora infestans*) is not much, and there is no figure of this disease of a most valuable crop, while on the next page following is a figure of *Cystopus candidus* attacking Shepherd's Purse. I do not grumble at the figure of the disease of Shepherd's Purse—far from it: it is good—but text-books of plant diseases addressed to agriculturists, gardeners and foresters, as well as botanists, should recognize the practical side of things, as this book so expressly did in its former editions. My point is therefore that, though expanded, and expanded well, it is not expanded enough. I trust that another ten years will not be required before we have a fourth edition in which expansion will be carried to symmetrical proportions.

It would be ungracious to part from so much that is good, admirable, and useful in a growling spirit. I do not complain so much as I ask for more from the same source. Prof. Hartig is far above criticism as an expounder of plant diseases —but I venture to think he could do better as the writer of a book, if he would give us more, rather than less, out of the stores of his experience.

G. M.

The Physiology of Plants. A Treatise upon the Metabolism and Sources of Energy in Plants. By Dr. W. Pfeffer. Second edition. Translated and edited by Alfred J. Ewart, D.Sc., &c. Vol. i. Large 8vo, pp. xii, 632, with 70 figs. in the text. Oxford: Clarendon Press. 1900. Price 28s.

The translation of Pfeffer's Physiology of Plants is a welcome addition to the familiar Clarendon Press series of botanical text-books, and teachers and students of botany owe a debt of gratitude to Dr. Ewart for his rendering into English of the German original. Two years have elapsed since the publication of the second German edition, but the insertion by the editor of references to more recent literature brings the volume as well up to date as we can expect in a general treatise. The term Physiology is used in its more restricted sense, and the present volume, as explained in the title, covers only a portion of the field, namely, the fundamental principles of metabolism and the sources of energy, or, in simpler language, the building up and breaking down processes associated with nutrition, and the supply of energy. The ways in which this energy is expended, including the most striking presentations of the plant as

a living organism, will presumably form the subject of the second volume, and we echo the hope, expressed in the translator's preface, that no long interval may elapse between the appearance of this second volume and of its translation.

The Clarendon Press had previously made accessible to English readers a treatise on plant physiology, namely, the well-known *Lectures on Physiology*, by Sachs, translated by Prof. Marshall Ward, and published thirteen years ago. Sachs used the term in a much broader sense, for the lectures include a great deal of plant morphology. They are, moreover, more suited to the general student than Dr. Pfeffer's work. The latter is heavy, often very heavy, reading, and avowedly written for the student who is specialising in physiology; the *Lectures*, on the other hand, can be read almost as general literature. Here, for instance, is a sentence taken at random from Dr. Pfeffer's introduction (p. 5): "Everything that goes on in a plant, every movement or alteration of any kind, whether chemical or physical, involves a change of energy just as it does in inorganic matter; either potential energy being converted into kinetic, or kinetic energy into potential. At the same time, the nature of the causal relationship is such that every vital process in the organism follows as a necessary consequence of its specific disposition and character." The reader is frequently reminded that lucidity and simplicity of expression are not always associated with great scientific abilities.

But the teacher and special student require a concise account of work done, and results achieved, together with authoritative criticism and references to original papers for more detailed information. Dr. Pfeffer, in supplying these, has done for the portion of physiology of which he treats a somewhat similar task to that performed by De Bary in the *Comparative Anatomy of Phanerogams and Ferns*.

The subject-matter is arranged in ten chapters, of which the first is introductory, including discussions on the aim of physiology, the nature of irritability, the causal relationship of growth and development, and, to a very limited extent, variation and heredity. Chapter II., Physiological Morphology, discusses from a physiological standpoint the structure and chemistry of protoplasm, the nucleus, &c., and their relation to the "cell"; Chapter III. treats of Molecular Structure and Associated Hypotheses; Chapter IV. deals with the "Mechanism of Absorption and Translocation"; and Chapter V., that of Gaseous Exchange. The Movements of Water in Plants, the subject of the next chapter, is considered under the headings of its conduction in the plant, its excretion as vapour, that is to say, transpiration, or in the liquid (incorrectly described as fluid) form in the bleeding of injured plants, or the water-excretion from slits or definite pores, or as nectar. The Food of Plants (Chapter VII.) includes an account of carbon-assimilation in the form of carbon dioxide, the absorption of organic food, nitrogen-assimilation, and the ash constituents. Chapter VIII., Constructive and Destructive Metabolism, is a history of the changes which the food material may undergo, and the value to the plant of the substances produced

in the process. The supply of energy is the subject of Chapter IX. (Respiration and Fermentation), while the last chapter, "Translocation," deals with the transference of material in the tissues of the plant.

The illustrations can hardly be described as an important feature of the book; their number is comparatively small. It would be well if original figures could be indicated. Finally, we may call attention to a matter of detail which in no way detracts from the scientific value of the work. It is well to follow generally accepted rules in writing plant names: one of these, which insists on the use of the capital for nominal specific names, is very rarely observed, and we find repeatedly *Allium cepa*, *Vicia faba*, *Zea mays*, and numerous similar cases. Occasionally the capital is used, as *Zea Mays* on p. 597 and in the index. We do not expect to find faults of this description in high-class and expensive works like the present.

A. B. R.

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*ARTICLES IN JOURNALS.**

Annals of Botany (June).—D. M. Mottier, 'Nuclear and cell division in *Dictyota dichotoma*' (1 pl.).—I. Parkin, 'Latex and its functions' (1 pl.).—B. J. P. Barker, *Saccharomyces anomalus* (1 pl.).—M. Dawson, 'Biology of *Poronia punctata*' (2 pl.).—H. Wager, 'Fertilization of *Peronospora parasitica*' (1 pl.).—W. H. Lang, 'Ovule of *Stangeria paradoxa*' (1 pl.).—J. H. Burrage, '*Nuytsia floribunda*.'—L. A. Boodle, 'Structure of stem in *Lycopodium*.'—W. C. Worsdell, 'Ovule of *Cephalotaxus*.'

Bot. Centralblatt (No. 26).—K. Müller, 'Bemerkungen zu einer Monographie der europaïschen *Scapania*-Arten.'—(Nos. 27–29). O. Lövinson, Ueber Keimungs- und Wachsthumsversuchte an Erbsen.'

Bot. Gazette (25 May). — B. M. Davis, 'Fertilization of *Albugo candida*' (1 pl.).—H. Hasselbring, 'Development of *Trichurus* and *Stysanus*' (2 pl.).—R. Wilson Smith, 'Sporophylls and sporangia of *Isoetes*' (concl.), (8 pl.).—H. H. Hume, '*Puccinia Thompsonii*, sp. n.'—W. W. Rowlie & S. P. Nichols, 'Taxonomic value of staminate flowers of Oaks.'—(30 June). R. E. Smith, '*Botrytis* and *Sclerotinia*' (2 pl.).—A. H. Conrad, 'Life-history of *Quercus*' (2 pl.).—E. J. Hill, 'Flora of White Lake region, Michigan' (map).

Bot. Notiser (Häft 3, 26 May). N. H. Nilsson 'Om de subarktiska *Poa*-arterna vid Lenafloden,—J. P. Gustafsson, 'Två svenska *Alopecurus*-hybrider.'—E. Nyman, 'Botaniska excursioner frå Java.'

Bull. Bot. Soc. France (xlvii, 4–5 : 28 June).—M. Gandoger,

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* The dates assigned to the numbers are those which appear on their covers or title-pages, but it must not always be inferred that this is the actual date of publication.

'Voyage botanique aux îles Baléares' (concl.).—Ch. Guffroy & M. Capoduro, 'Notes tératologiques.'—C. A. Picquenard, 'Etymologie du mot *Malus*.'—E. Drake del Castillo, 'Adrien Franchet' (portr.).

Gardeners' Chronicle (7 July).—G. Massee, *Cecospora Bolleana* (fig. 2).

Journ. Linn. Soc. (xxxiv, 20–240 : 1 July).—G. Massee, 'Origin of Basidiomycetes' (2 pl.).—E. S. Salmon, 'Mosses from China and Japan' (1 pl.).

Malpighia (xiii, fasc. 11, 12 : recd. July 18).—P. A. Saccardo & G. Bresadola, 'Funghi della Valsesia.'—R. Pirotta & E. Chiovenda, 'Illustrazione di alcuni Erbarii antichi Romani' (concl.).—O. Penzig, 'Fasciazione singolare osservata nel Cavolfiore' (1 pl.).—Id., 'Sul genere *Mycosyrinx*' (2 pl.).

Mém. de l'Herb. Boissier (No. 16 : 25 June).—F. Stephani, 'Species Hepaticarum'—(No. 17 : 30 June). R. Chodat, 'Trois genres nouveaux de Protococcoidées' (*Lemmermannia*, *Catena*, *Hofmania*).—A. Rodrigue, 'Les feuilles panachées et les feuilles colorées.'

Rhodora (June).—Edwin Faxon (16 Sept. 1823—12 June, 1898 : portr.).—R. E. Schrenck '*Rhadinocladia*, n. gen.' (Marine Algæ) (1 pl.)—H. Webster, '*Naucoria Christinæ*.'—(June & July). W. A. Setchell, 'New England Species of *Laminaria*.'—(July). M. L. Fernald, 'Present influences upon our north-eastern flora.'—R. G. Leavitt, 'Reversions in *Berberis* and *Sagittaria*' (1 pl.).

BOOK-NOTES, NEWS, &c.

At the meeting of the Linnean Society on June 21st, Dr. O. Stapf exhibited fruits of various forms of *Trapa* from Europe, China, and India, and discussed the differentiation of the genus into species. He was inclined to recognize five species which inhabit fairly well-defined geographical areas; but as the discrimination of these depends chiefly on the armature and sculpture of the mature fruit (the flowers being in some cases unknown, and in others very poorly represented in herbaria), he found it at present impossible to define the species satisfactorily. Unpublished drawings of Indian and Chinese species in the collections at Kew rendered it probable that certain differences in the fruits would be found to be correlated with differences in the structure of the flowers. Mr. Clement Reid exhibited a series of plum-stones recently found in a drain of the Roman baths, and in a rubbish-pit, at Silchester. The species identified were *Prunus avium*, *P. domestica*, *P. insititia*, *P. spinosa*, and *P. Lauro-cerasus*. Besides these, there was a large variety of Plum, and a very small Sloe, the species of which had not as yet been precisely determined. Dr. A. B. Rendle, referring to his recently published revision of the

genus *Najas* (Trans. Linn. Soc. 2nd ser. Bot. vol. v. part 12), read a supplementary paper on the same subject, in which he gave additional information gained from a recent examination of specimens in eleven continental herbaria, particularly those at Paris, Geneva, Vienna, and Berlin. Some new forms were described (notably a new species from Senegal), and some fresh notes were added on the geographical distribution of several imperfectly known species. Since the publication of the paper referred to, the author had had the advantage of examining a number of specimens which had been collected in south-eastern Russia and the Malay Archipelago, and were forwarded from the Museum at St. Petersburg.

The Transactions of the British Mycological Society for 1898–9 (prtce 3s. 6d.; Baylis, Worcester) contains papers on *Uredineæ* and *Ustilagineæ*, by Mr. Charles Plowright; on *Mollisia cinerea*, by Mr. Charles Crosland; notes on Fungi new to Britain, by Miss A. L. Smith; and an anonymous account of *Lactarius theiogalus* Fr., with a coloured plate. The proofs in some places do not seem to have been corrected.

Mr. Spencer George Perceval has lately published in the *Proceedings of the Bristol Naturalists' Society* (vol. ix. part 1) an interesting "Journal of an Excursion to Eastbury and Bristol in May and June, 1767," by Sir Joseph Banks. The Journal is prefaced by an account of the distressing dispersion of Sir Joseph's correspondence by his great-nephew, Lord Brabourne, who claimed all the Banksian documents in the Botanical Department of the British Museum, carried them off, and had them put up to auction at Sotheby's, where they were divided into 198 lots, and realized but a small sum. Several localities for plants are noted in the Journal—*e. g.* "I saw through the Windows of my Chaise, Myrica Gale growing in Plenty upon a Bog near the 21 mile Stone on Bagshot heath." Plants collected by Banks on St. Vincent's Rocks are in the National Herbarium. Mr. Perceval contributes some interesting notes to the Journal.

Parts 4 and 5 (May and June) of *Icones Selectæ Horti Thenensis* (Monnom, Brussels) which M. de Wildeman is superintending, are noteworthy for the excellent plates by M. d'Apréval, as well as for the detailed descriptions and copious notes by the editor. No. 4 contains *Escallonia viscosa*, *Melothria punctata*, *Corethrogyne filaginifolia*, *Ardisia humilis*, and *Buddleia auriculata*; no. 5, *Acacia obliqua*, *Crassula Schweinfurthii*, *Olearia erubescens*, *Cavendishia pubescens*, and *Ligustrum Massalongianum*.

The fourth Appendix to the Kew Bulletin for 1900, containing a "List of Staffs in Botanical Departments at home [excluding the British Museum], and in India and the Colonies," has been published. So far the volume for this year consists entirely of Appendixes, no number of the *Bulletin* having been issued since that for "September and October," 1899.

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SENIOR ASSISTANT, DEPARTMENT OF BOTANY, BRITISH MUSEUM (NATURAL HISTORY)

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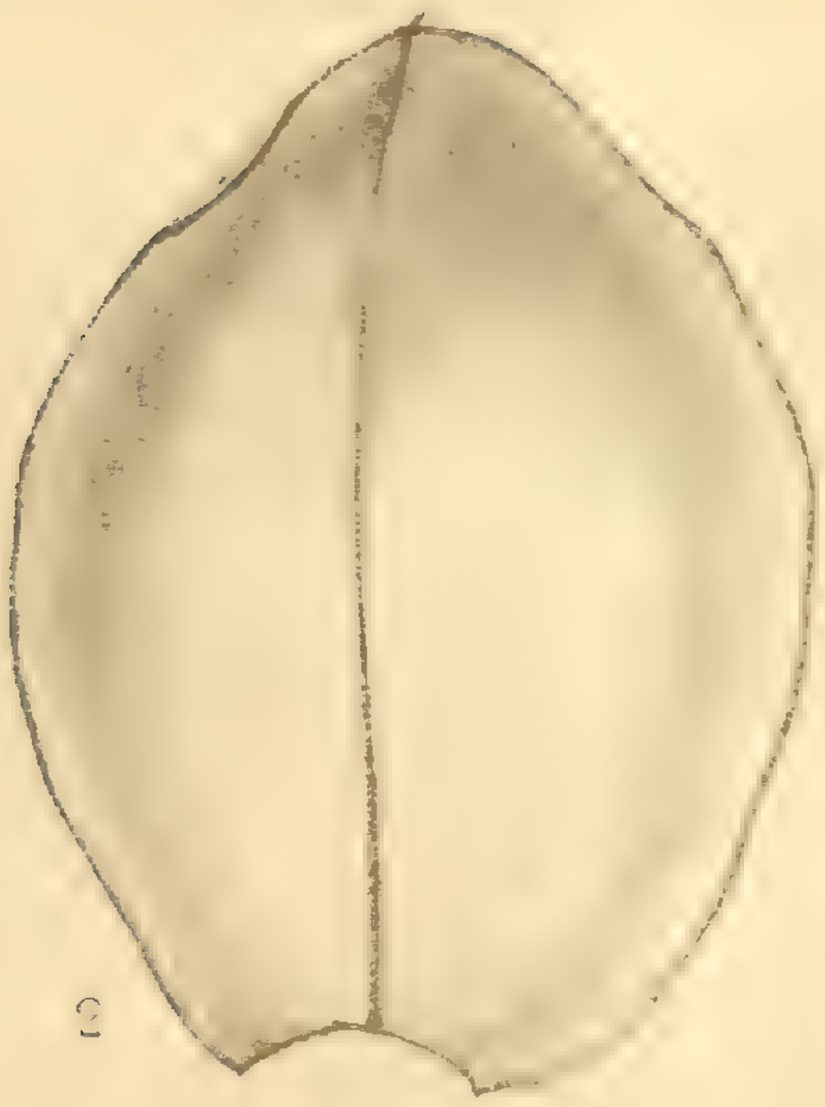

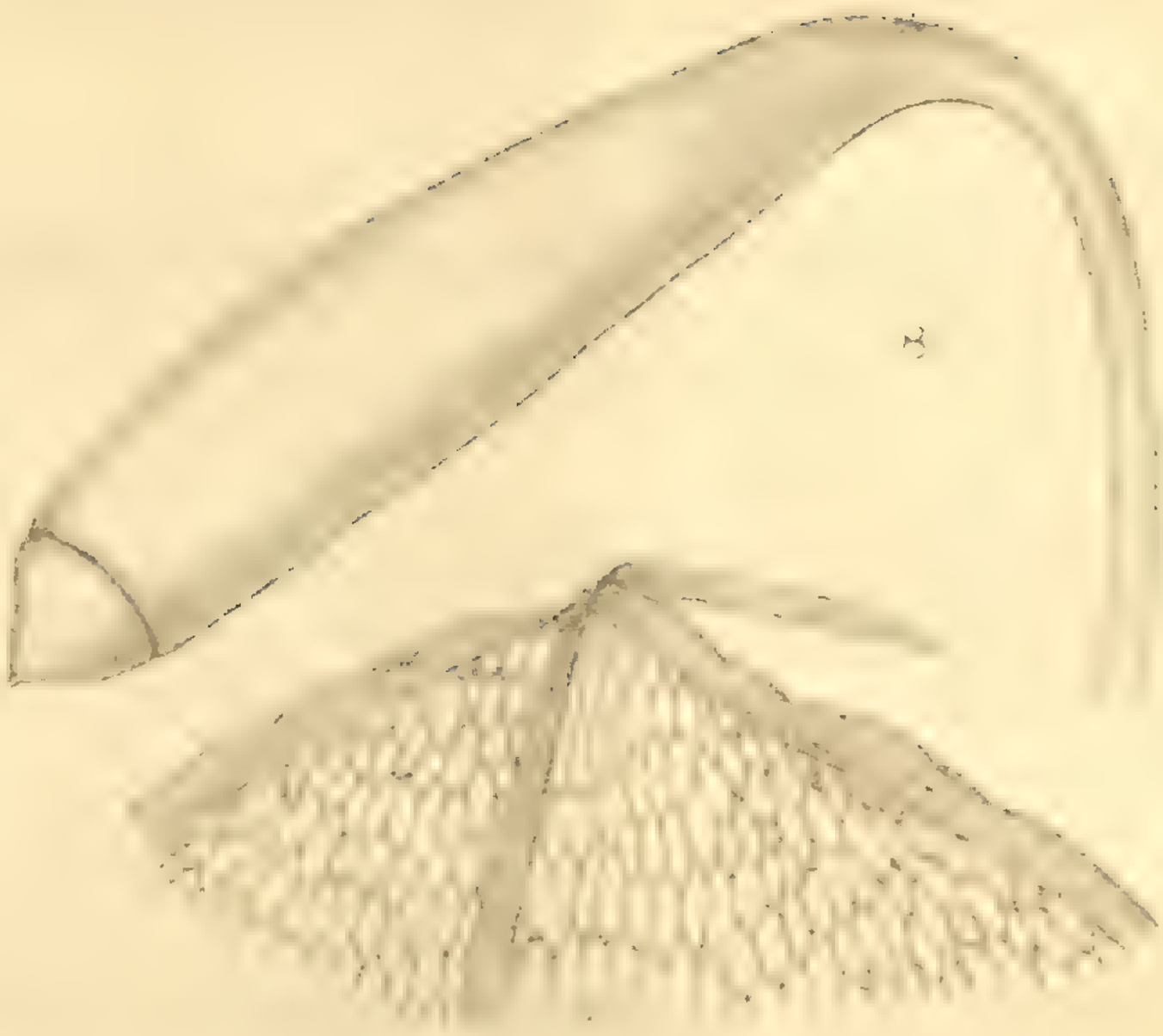

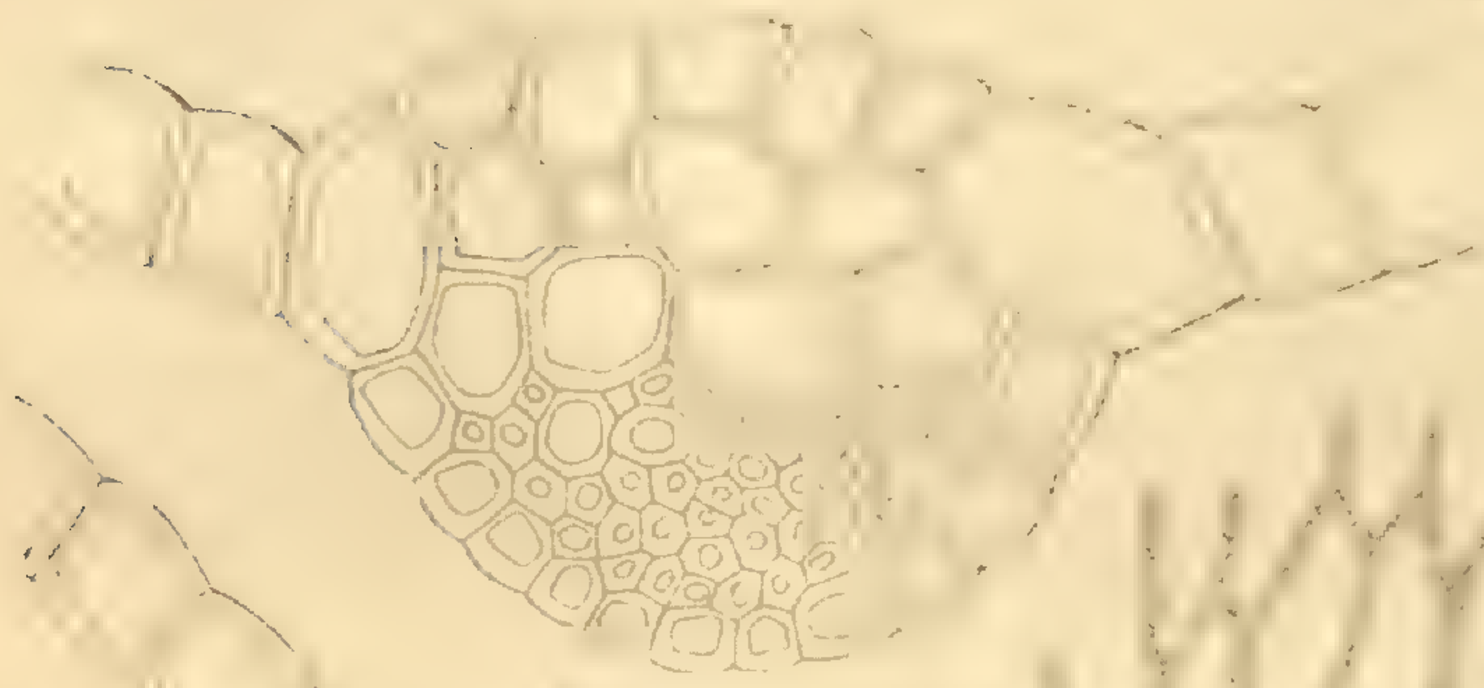

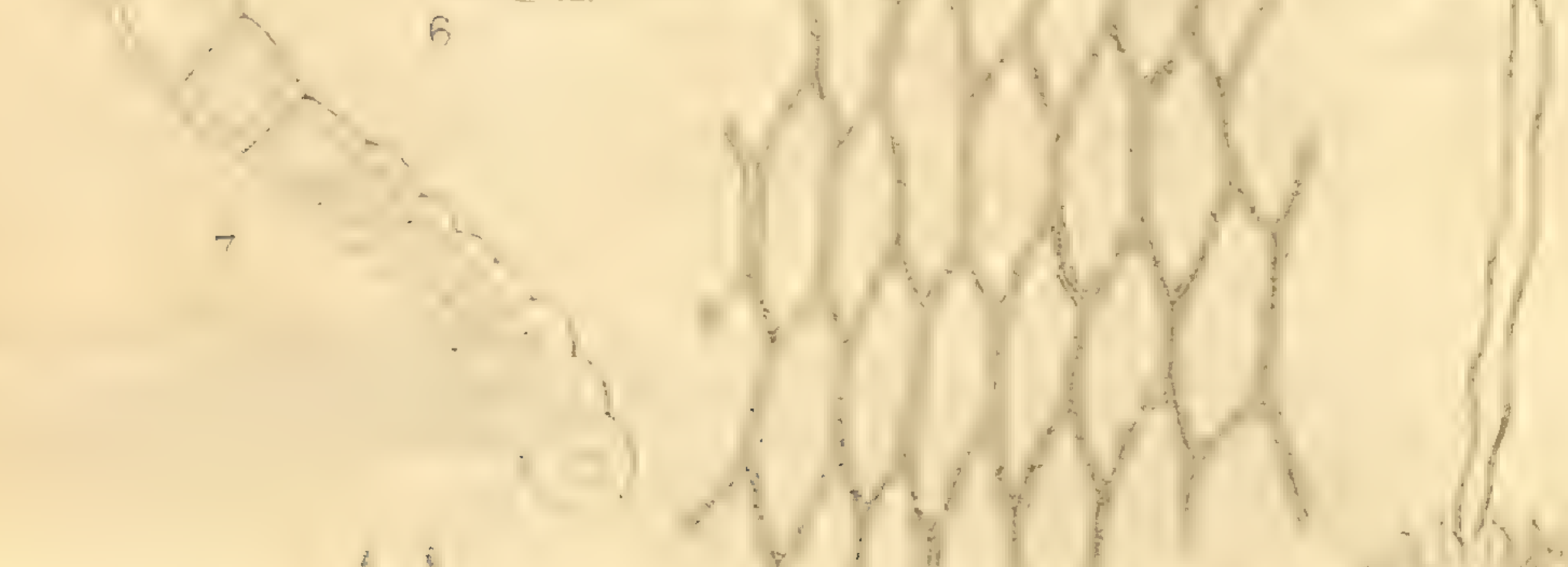

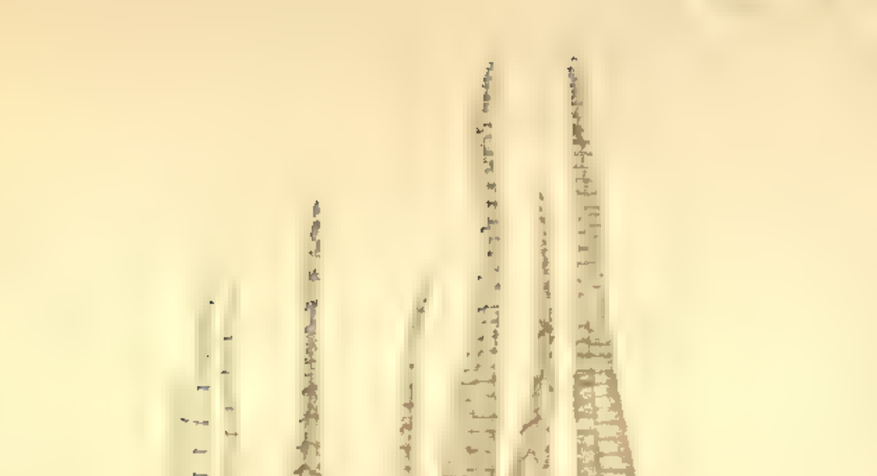

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Bryum [illegible] Mitt

BRYUM (RHODOBRYUM) FORMOSUM Mitt.

By Ernest S. Salmon, F.L.S.

(Plate 413.)

Dioicum ?, cæspitosum, cæspitibus e melleo vel succineo rufescentibus, caule ad 6 cent. alto e rosula prolificante ad basin folioso, foliis inferioribus minoribus remotioribus subplanis, superioribus majoribus imbricatis haud decurrentibus, apicalibus in rosulam congestis magnis 6 mill. longis $4\frac{1}{2}$ mill. latis ovato-oblongis apice cymbiformi-concavis siccitate nitentibus, margine (nisi basi infima) haud revoluto, nervo e basi rufa latiore angustato in mucronem recurvatum excurrente, cellulis subhexagonis 95–125 μ longis 20–25 μ latis apicem versus minoribus omnium parietibus valde porosis, cellulis marginalibus circiter sexseriatis angustis incrassatis limbum rufescentem unistratosum efformantibus, foliis perichætialibus exterioribus caulinis similibus interioribus angustioribus triangulari-lanceolatis nervo longius excurrente, capsula ex eodem perichætio solitaria vel binata in pedicello longo (circiter 4 mill.) erecto solido rufo-purpureo inferne plus minus flexuoso apice arcuato nutante cylindrica elongata circiter 7 mill. longa $1\frac{1}{2}$–$1\frac{3}{4}$ mill. lata rufo-brunnea in collum sensim attenuata sicca sub ore haud constricta stomatibus superficialibus maguis ad capsulæ basin restrictis, peristomii externi dentibus lanceolato-subulatis, interni membrana lata ad dentium medium exserta processibus in carina lacunosis ciliis (2–3) interpositis, operculo mamillari, annulo lato composito spiraliter revolubili, sporis lævibus 17–20 μ diam.

Patria. India (No. 492 in Herb. Beddome at Kew); Nilghiris, Sispara, 7000 ft., Nov. 1883, leg. J. S. Gamble. No. 13312, in Herb. Brotherus.

Species procera et formosa, *B. Wightii* Mitt. affinis, sed colore, habitu robustiore, caule rosulato nec non folii margine haud revoluto distincta.

A few months ago I noticed among the Indian mosses of Col. R. H. Beddome's herbarium (now at Kew) a fruiting *Rhodobryum*. As this moss, which was labelled "*Bryum formosum* no. 492," appeared on examination to be quite distinct in colour, habit, &c. from all other described species of the genus, I submitted it to Dr. V. F. Brotherus, who has specially studied the bryology of India. Dr. Brotherus kindly replied as follows:—"I have examined the moss you sent me, and beg to inform you that it is, no doubt, quite different from both *B. Wightii* and *B. nilghirense*. I have for many years been in possession of the same species from the Nilghiris, and now add a specimen of it." The specimen (barren) referred to is labelled, "*Bryum formosum*, Nilghiris, Sispara, 7000 ft. Nov. 1883, leg. J. S. Gamble."

Mr. Mitten kindly informs me that "*B. formosum*" was one of several unpublished manuscript names attached by him to the mosses of Col. Beddome's herbarium.

B. formosum, although showing some affinity with *B. Wightii*,

is very distinct in the amber- or honey-coloured tint of the upper part of the stems, and of the innovations, in the rosulate stems, and in the erect margin of the leaves.

EXPLANATION OF PLATE 413.

FIG. 1. *Bryum* (*Rhodobryum*) *formosum;* fertile plant, nat. size. 2. Leaf, from upper part of stem, × 12. 3. Apex of same, × 95. 4. Areolation of leaf at one-third from base, × 255. 5. Ditto, near apex, × 255. 6. Transverse section of nerve, towards base of leaf, × 255. 7. Ditto of margin of leaf, × 400. 8. Capsule, with operculum, × 12. 9. Part of peristome, × 68.

NEW AND RARE MOSSES FROM BEN LAWERS.

By H. N. DIXON, M.A., F.L.S.

BARBULA ICMADOPHILA Schimp. This species, which I gathered on Ben Lawers in 1893 (the first British record), and again within a few days at Quiraing, Skye, was again found on Ben Lawers by Mr. Jas. Murray in 1899.

WEBERA CUCULLATA Schimp. Messrs. Nicholson, Salmon and I gathered this species in quantity and fruiting well on the north-east slope immediately below the summit towards L. na Chat, in July, 1899, at above 3500 ft. It occurs on the bare ground in extremely dense, hard tufts, with rigid sterile shoots bearing closely imbricated leaves reflecting a slight lustre or gloss, so as to resemble small forms of *W. commutata*. In fact, on gathering the same plant (sterile) in 1893, I had referred it doubtfully to that species, and should have allowed it to pass indeed on the present occasion for the same, had not an examination of the fruit by Mr. Nicholson revealed the paroicous inflorescence and other fruiting characters of *W. cucullata*. That species, it is true, is described as "not glossy," in contradistinction to *W. nutans*, but unquestioned continental specimens, of Schimper's own gathering, with which our specimens entirely agree, show the same glossiness that we found here; it is certain that too much reliance may be placed on this character in the genus *Webera*.

WEBERA COMMUTATA Schimp. A dioicous species of *Webera* occurs with some frequency towards the summits of the higher Perthshire hills, on the sandy detritus formed principally from the micaceous schist, having the leaves of the rigid sterile shoots imbricated and often closely appressed when dry, and bearing occasional bulbils in their axils. Capsules are frequently present, and are often produced in some abundance. When ripe they are of a rich purple-brown, with something of the glaucous "bloom" characteristic of *W. carnea*, obovate-oblong, with distinct and rather long neck.

I have until recently, in common, I believe, with most British bryologists, considered this to belong to *W. annotina*, and have distributed it, from Ben More, Ben Douran, Craig Chailleach, the Sow

of Athol, &c., under that name; and the same plant has been distributed under the same designation by continental bryologists. Recently, however, Dr. Hagen has pointed out that this is an error and that it is really *W. commutata* Schp. Most Scandinavian bryologists have, he says, fallen into the same mistake, due no doubt in great measure to the close similarity between the two species, and especially to the presence of axillary bulbils in both. Consequently the recorded distribution of the two species will need very careful revision (v. Hagen, Musci Norveg. borealis, pars prima, p. 110, 1899—in Tromsö Museums Aarshefter, 21–22). While accepting Dr. Hagen's correction, I am bound to say that I find considerable difficulty in separating the two species as thus understood. The metallic gloss or lustre on the leaves of *W. commutata* is pointed out as affording a critical distinction, and this character, present in all our alpine plants above referred to, is no doubt of much value; still forms of *W. annotina* most certainly do at times exhibit some degree of glossiness, while on the other hand the character is not invariably associated with *W. commutata*. The researches of Correns, H. Lindberg, and others, have thrown fresh light on several of the species belonging to this genus, and a revision of *Webera*, embodying these results, and setting forth clearly the distinctive characters of the species, would be of great assistance to bryologists.

Bryum arcticum R. Br. This species, originally discovered on Craig Chailleach for the first time in Great Britain, in 1898 (v. Journ. of Bot. 1899, p. 308), was gathered again on Ben Lawers, last July, by Messrs. Nicholson, Salmon and myself, in the western corrie, within a few hundred feet of the summit. The specimens agreed precisely with those from Craig Chailleach (where we gathered it again a couple of days later in the original locality), and occurred in an exactly similar habitat, on bare, exposed, micaceous soil. The plant is conspicuous (when one knows what to look for!) by the purple-red colour of the foliage, the gregarious habit, and the small, pale capsules. It may be interesting to readers who have not seen the article on *Bryum Lawersianum* cited below, to translate Philibert's remarks which he there makes concerning the Craig Chailleach *B. arcticum*: "It represents a variety of *B. arcticum* scarcely differing in the main from those which have been observed in Norway, the Alps, and the Jura, but remarkable at first sight by the bright red colour."

Bryum Lawersianum Philib. We gathered this plant on the same occasion (v. Philibert, Rev. Bry. 1899, p. 99), on bare earth, just as in the case of *B. arcticum*, and on the same side of the mountain, but at a considerably lower level. The habit was very different, the plants being more scattered, of a dull green, the seta longer, the nerve of the leaves less longly excurrent, the fruit slightly less mature. Microscopical examination reveals further differences, notably in the peristome, which Philibert has described with his accustomed care and minuteness in the above article. The detailed description of the characters is too long to cite here, but,

as some British students may not have access to the pages of the *Revue Bryologique*, I translate the remarks in which he sums up some of the characters which separate the new species from some of its nearest allies:—"This plant is distinguished from *B. arcticum* primarily by the absence of 'cloisons accessoires' ('oblique lines' of Ptychostomum in the *Student's Handbook of British Mosses*) on the inner layers of the peristome teeth, but this difference is not the only, nor even the most decisive one. We do, indeed, find now and then, in Scandinavia and in the Alps, forms which are evidently closely related to typical *B. arcticum*, but which have the inner layers of the outer peristome simple and regular (*i.e.* without 'cloisons accessoires'); such, in particular, is the plant found in Kongsvold by M. Kindberg, which I have named *B. Kindbergii*; another, gathered in the island of Aland by M. Bomansson, is remarkable for the globular sporangium of the capsule, abruptly contracted into a long narrow neck. But in these forms with regular peristome teeth, almost all the other characters remain the same as in the forms with 'cloisons accessoires'; the leaves are as narrowly acuminate and distinctly margined; the nerve longly excurrent; the areolation lax, of hyaline, rather large cells; insomuch that we can hardly consider these as anything but subspecies of *B. arcticum*. The *Bryum* from Ben Lawers is at once separated from these subspecies and from the normal varieties of that species: 1st, by the structure of the leaves, the lowest broadly oval or suborbicular, with a nerve ceasing below the apex; the comal leaves themselves much less acuminate, the nerve excurrent only in a short point; the branch leaves muticous, plane at margin and without a border; 2nd, by the areolation, firm, opaque and close; 3rd, the capsule, regularly oval, brownish in colour like the rest of the plant, gives the plant a special facies which enables it to be at once recognized."

It should be added that Dr. Hagen, who has studied the Brya, and especially the Scandinavian species, very carefully, is of opinion that *B. Lawersianum* does not belong to the "*arcticum*" group of species, but to the "*pallens*" group. He holds it to be nearly allied to *B. Lindbergii* Kaurin, a plant which I have never seen, and which, as far as I am aware, has only been gathered in one station in the Norwegian Alps, where it was discovered by Kaurin in 1883. Limpricht describes this as one of the species that bridges over the division between Cladodium and Eubryum, a description which certainly appears to apply well to our Ben Lawers plant.

Unfortunately we gathered *B. Lawersianum* in too small quantities to allow of distribution at present. I hope, however, that at some future opportunity further specimens may be obtained, and in a slightly more mature condition. Mr. Nicholson has, it may be mentioned, placed a specimen in the British Museum Herbarium.

Mnium spinosum Schwgr. In all the references that I have seen to this fine species as a Perthshire plant it is recorded solely from "Ben Lawers"; it may be as well to mention that it occurs also on the adjoining mountain of Craig Chailleach, where I have

gathered it in one or two situations. This may very likely be known to local botanists, but I have not seen it recorded.

MNIUM LYCOPODIOIDES (Hook.) Schwgr. In July, 1893, upon my first visit to Ben Lawers, I gathered a *Mnium* of the Biserratæ group of something the appearance of *M. serratum* Schrad., but in rather looser tufts, and with less crowded leaves, which gave it a slightly different habit. Microscopical examination showed the inflorescence to be dioicous, terminal female flowers alone being present; but the cells, instead of being small, as in *M. orthorrhynchum*, were from 18 to 25 μ in diameter (averaging about 20 μ), and in form resembling those of *M. serratum* or *M. riparium* rather than those of *M. orthorrhynchum;* I was obliged reluctantly to consider it a form of *M. riparium*, a species that has been found by Mr. Meldrum in Perthshire, but which, though in its anatomical characters hardly distinguishable from the Ben Lawers plant, is entirely different in its usual habit and texture. Recently, however, doubts again prevailed, and a comparison of specimens and descriptions led me to suspect that it might really be *M. lycopodioides* Schwgr. I therefore sent it to Philibert, who has made an exhaustive study of this plant and its relationship to the allied species (v. Rev. Bry. 1895, pp. 2, sqq.). His reply was to the effect that it was certainly referable to *M. lycopodioides*, so far as could be determined without fruit.

The position of *M. lycopodioides* as a species is contested by some authors; Husnot, for example, describes it as a variety of *M. orthorrhynchum.* Most writers, however, maintain it as an independent species, though admitting its close affinity to others of the group. The more obvious distinguishing marks may be summed up thus. The stems are taller than in *M. serratum* and *M. orthorrhynchum*, with more distant leaves, which are more decurrent and more strongly toothed, often being serrate almost to the base. The cells are larger and the cell cavity less angular than in *M. orthorrhynchum*, scarcely distinguishable, in fact, from those of *M. serratum* and *M. riparium.* The former, however, differs radically in the synoicous inflorescence; *M. riparium*, while agreeing in the inflorescence and areolation, is very different in habit and of smaller size, the leaves more rounded, scarcely acuminate and less decurrent, less sharply toothed; and Philibert points out also distinguishing characters of considerable weight in the capsule and peristome.

MYURELLA JULACEA var. SCABRIFOLIA Lindb. In July, 1899, Mr. H. W. Monington, collecting on Ben Lawers, gathered a *Myurella*, which, upon examination, appeared to belong to *M. Careyana* Sull. Subsequently Mr. Nicholson, to whom Mr. Monington mentioned the matter, found among the collections we had made on the Ben two or three days only after Mr. Monington's visit, a few stems of the same plant creeping among other mosses. A few days earlier in the month Mr. Jas. Murray had collected the same plant, which he sent me labelled "*Myurella Careyana*, Ben Lawers, 3500 ft." Thanks, however, to a note by M. Thériot in the *Revue Bryologique*

for 1898 (p. 26), I recognized that these plants, though in almost every respect identical with *M. Careyana*, really belonged to *M. julacea* var. *scabrifolia* Lindb., which is described as differing from the type in the "leaves apiculate, with longer denticulations at basal margins, scabrous at back with long papillæ." This description will be seen to apply equally well to *M. Careyana*, the prominent feature of which species is the strongly spinulose-toothed margin of the leaves; in *M. julacea* (type) and *M. apiculata* it is only slightly denticulate. It is indeed practically impossible to perceive any difference between extreme forms of *M. julacea* var. *scabrifolia* and *M. Careyana* except in one important character, *viz.* the nature and position of the papillæ on the leaf-cells. These in *M. julacea* are conical projections of the end walls of the cells at the point where two cells meet, such as are very frequent in Bartramiaceæ, not, as usual, arising from the face of the cell. In *M. Careyana* they are situated centrally or nearly so on the face of the cell. The distinction would seem to be a structural one, not simply a difference in position, and therefore must be allowed some weight.

The central papillæ of *M. Careyana* are plainly visible by examining the back of the leaf with a fairly high objective; and the differently placed papillæ of *M. julacea* can also be observed, with a little more difficulty, by careful focussing under a high power. Cutting a transverse section of the leaf is perhaps a more satisfactory, but a more lengthy process.

There appears to be a fairly unbroken chain of forms in the var. *scabrifolia*, from those nearly approaching the type to such marked forms as that described above, similar in almost every respect to *M. Careyana*.

It is curious that this variety, not hitherto recorded from Great Britain, should have been gathered on Ben Lawers by three separate collectors independently within a space of less than a fortnight. In each case only a few stems were found interwoven among other mosses.

PSEUDOLESKEA ATROVIRENS B. & S. and P. PATENS Limpr. In 1790 Dickson published his *Hypnum atrovirens*, founded upon a specimen from Scotland. Bruch and Schimper created the genus *Pseudoleskea* in 1852, to include *H. atrovirens* Dicks. and *H. catenulatum* Brid. In 1880 Lindberg described his *Leskea patens* from Norwegian specimens, afterwards transferring it to the genus *Lesquereuxia*. Limpricht referred this also to *Pseudoleskea*.

About a year ago Dr. Best, of Rosemont, New Jersey, who has been engaged in a revision of the North American Leskeaceæ,* sent me specimens of two or three Scotch plants, distributed under the name of *H. atrovirens* Dicks. by Wilson, Greville, &c. These clearly belonged to two distinct species, characterized by the form and direction of their leaves, the form of the cells, and the position of

* Since this was written Dr. Best's Revision has been published in Bull. Torrey Bot. Club, May, 1900.

the papillæ; the one in fact being the widely spread British and Continental plant figured and described by Bruch and Schimper as *P. atrovirens*, which has passed well-nigh universally for Dickson's moss; the other corresponding exactly with *P. patens* (Lindb.) Limpr. Dr. Best desired to have these plants compared with the type of Dickson's *H. atrovirens* in the British Museum Herbarium, with a view to determining which of the two represented the original specimen. This examination Mr. Gepp was good enough to make, with the result that Dickson's type was found to be *not* the *P. atrovirens* of the *Bryologia Europæa*, but, on the contrary, identical with the plant named *L. patens* by Lindberg.

The facts are, I think, indisputable; nor can there be any doubt of the value, as species, of the two plants. Hence a strict interpretation of the law of priority applied to the *specific* name alone would require that the name of *P. atrovirens* (Dicks.) should be henceforward applied to the plant known for the last twenty years as *Pseudoleskea* (or *Lesquereuxia*) *patens;* while the plant generally known throughout the first half of the century as *H. atrovirens*, and universally during its latter half as *P. atrovirens*, would have to find another name. The confusion likely to arise from such a *bouleversement*, even if it ended here, as would very likely not be the case, is not pleasant to contemplate; nor, to those for whom a "name" consists not of the specific name alone but of the combination of generic and specific names, is there the least necessity for such a change; all that is required would be to designate the common plant as "*P. atrovirens* B. & S. (non *H. atrovirens* Dicks.)," or "*P. atrovirens* B. & S. (= *H. atrovirens* auct. plur. *non* Dicks.)."

P. patens Limpr. is a less frequent and less widely distributed plant in Europe than *P. atrovirens* B. & S. Both occur with us; the latter on several of the higher Scotch mountains—on Ben Lawers in considerable abundance. *P. patens*, on the other hand, is rare, and, as far as I know, has only been found with us on the Ben Lawers range. Hagen (Rev. Bry. 1891, p. 8) writes that he has it from "Scotland, cfr."; I gathered it on Craig Chailleach in 1897 sparingly, and it has been gathered by various collectors on Ben Lawers from Dickson's time onward, but has not apparently until quite recently been separated from *P. atrovirens* B. & S. The chief points of difference between the two species are that in *P. atrovirens* B. & S. the leaves are more or less secund and curved downwards, and the stems and branches hooked or curved at apex; the cells at mid-leaf are irregularly oval-rhomboid or hexagonal, mostly one and a half or two times as long as broad at least, and bearing the papillæ on the joint wall of two adjacent cells (as described above for *Myurella julacea*). In *P. patens* the leaves are spreading in all directions and divergent from the stem when moist, not secund; the median cells are almost isodiametric, rounded-hexagonal, and with a large conical papilla in the middle of the face of the cell (as in *M. Careyana*), and on both sides the lamina. It would be desirable to search herbaria to determine the exact distribution of the two species in this country.

SOME MANUSCRIPT NOTES BY PLUKENET.

By G. S. Boulger, F.L.S.

In the notice of Plukenet in Trimen and Dyer's *Flora of Middlesex* it is stated that copies of both editions of Ray's *Catalogus Plantarum Angliæ* with manuscript notes by him are in the British Museum library. I have not yet traced his copy of the second edition; but there can be no doubt that the volume bearing the press-mark 968. f. 2 is his copy of the first edition, that of 1670. The manuscript notes contain, as we shall see, strong internal evidence of this; one of them is signed "L. P.," and the volume is stated to be Plukenet's copy in one of Rev. W. W. Newbould's manuscript note-books.

Most of the manuscript notes it contains are merely critical, dealing with matters of pre-Linnean synonymy now of little interest; but some include localities, which, although in most cases since published, make them, perhaps, worth transcribing in the *Journal of Botany*. I have merely added modern names and the briefest notes. The order is that of the pages of Ray's *Catalogus* (ed. i.).

P. 37.— Auricula leporis minima J. B. The least Hare's ear. "at y^e^ Haven side at Boston Lincolnshire by S^r^ (?) * Antony Irby's House. in Dolwich Common not far from y^e^ windmil on y^e^ left hand of it a little short of y^e^ Tyle-kill as you goe from y^e^ Town to y^e^ wood y^t^ leads unto y^e^ Wells† plentifully." (*Bupleurum tenuissimum* L.)

P. 54.—Cardamine impatiens altera hirsutior. "Convulsion wool as they cal it in Devonshire." (*Cardamine hirsuta* L.) This name, which I should possibly have transcribed "Convulsion weed," is not in Messrs. Britten and Holland's *Dictionary of Plant-Names*.

P. 60.—Maiden Pinks. "it groweth plentifully in Surrey neer Croyden." (*Dianthus deltoides* L.)

P. 79.—Conyza palustris. Marsh Fleabane. "along ye River Bank in y^e^ Town of March in y^e^ Ile of Ely." (*Pulicaria dysenterica* Gaertn. ?)

P. 94.—Dipsacus minor. Shepherd's Rod. "at Croyden plentifully & neer my Lord of London's at Fulham." (*Dipsacus pilosus* L.) This latter locality is recorded by Merrett, Newton, Petiver, and Thomas Martyn (*Flora of Middlesex*, p. 146).

P. 96.—Ebulus humilis. Dwarf Elder. "Kerton & Fishtoft (?) in Lincolnshire and in Marshland between Wisbech and Lyn in y^e^ Fields there." (*Sambucus Ebulus* L.)

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* Possibly "Captain," mentioned as a cousin of Plukenet's (*Flora of Middlesex*, p. 374).

† These wells, frequently mentioned in the notes, would seem, from information kindly furnished me by M. Teesdale, Esq., of Dulwich, to have been those between Sydenham and Lewisham mentioned by Evelyn in 1675, and in *Notable Things* by Dr. Peters (1648).

P. 113.—Filix marina Anglica *Park.* Dwarf Sea Fern. "& at Weston super mare in Somersetshire L. P." (*Asplenium lanceolatum* Huds.)

P. 136.—Gnaphalium Anglicum *Ger.* Great English Cudweed. "in y^e^ wood you goe thorough from Dolwich to y^e^ wells & in y^e^ edge of Carlton woods by Greenich plentifully." (*Gnaphalium sylvaticum* L.)

P. 151.—Gramen junceum spicatum seu triglochin. Arrow-headed grass. "beyond Dolwich not far from y^e^ wells in rills of water there. if you go from Dolwich it is on y^e^ right hand of y^e^ Wells in y^e^ watery Bottoms and Plashes there." (*Triglochin palustre* L.)

P. 152.—Gramen marinum spicatum *Clus.* Sea spiked grass. "on y^e^ Havens side at Boston." (*Triglochin maritimum* L. (?))

P. 171.—Horminum sylvestre Lavendulæ flore C. B. Wild Clary. "Inveni ipsemet hoc Greenvici sub muro." (*Salvia Verbenaca* L.)

P. 203.—"Lysimach. bifolia flore luteo globoso in Yorkshire fast by Cowick y^e^ Ld. Viscount Down's seat found by Mr. Dodsworth." (*Lysimachia thyrsiflora* L.)

P. 209.—Militaris aizoides *Ger.* . . . Water Sengreen, or Fresh-water Souldier. "in a River or great draine in the East Fen Lincolnshire & in a ditch in the way from Lyn to Germans bridge in Marshland." (*Stratiotes aloides* L.)

P. 210.—Millefolium aquat. pennatum spicatum C. B. "in y^e^ fens of Lincolnsh. neer Boston & upon Dolwich Common neer Cap. Thompsons house in a watery place there." *Myriophyllum spicatum* L.)

P. 211.—Millegrana minima *Ger.* The least Rupture wort, or All-seed. "upon Putney Heath by y^e^ Bowling Green." (*Radiola linoides* Roth.)

P. 223.—"Œnanthe staphylini folio aliquatenus accedens J. B. in a ditch in y^e^ Fens of Lincolnsh. neer Quaplod his oculis vidi, et nostris manibus tractavi." (*Œnanthe Lachenalii* Gmelin.) In the first edition of Ray's *Synopsis*, pp. 239–242 of the Appendix are occupied by a list entitled "Stirpes & Observationes à Clariss. Viro D. Leonardo Plukenet M.D. communicatæ," in which (on p. 241) this species is recorded "in parochia Quaplod, Agri Lincolniensis, non procul ab oppido *Spalding.*" It is, no doubt, the village now known as Whaplode.

P. 223.—Œnanthe cicutæ facie Lobelii *Park.* "juxta Tamesin copiosissime." (*Œnanthe crocata* L.)

P. 228.—Orchis spiralis alba odorata J. B. "By Dolwich Wels on y^e^ left hand as you go from y^e^ Town though . . . sparingly about a flight-gled (?) from y^e^ Wells." (*Gyrostachis autumnalis* Dum.)

P. 240.—Phyllitis *Ger.* Harts tongue. "Millions of it about Bristol in y^e^ Lands & Roads all over." (*Scolopendrium vulgare* Symons.)

P. 245.—Plantago aquatica minor *Park.* Dwarf Water Plantain. "in a little bog and y^e^ wood as you go from Dolwich to y^e^ Wells." (*Alisma ranuculoides* L.)

P. 249.—Abele. "in Surrey." (*Populus alba* L.)

P. 285.—Sium alterum Olusatri facie Lob. "between Cowley & Hillingdon." (*Cicuta virosa* L.)

P. 286.—"Solanum baccis aureis upon a dunghill within a quarter of a mile of Dolwich." (*Solanum nigrum* var. *luteo-virescens* (Gmel.) ?.)

P. 292.—"Sphondylium majus aliud laciniatis foliis. upon y^e^ Edge of Hartforsh. beyond Reickmeersworth." (*Heracleum Sphondylium* var. *angustifolium*.) In the Appendix to the *Synopsis* already referred to, this locality appears (p. 241) as "my own farm upon Horn-hill near S. Peters Chalfont." See also Plukenet's will, *Journal of Botany*, 1882, p. 341.

P. 306.—Trifolium pumilum supinum flosculis longis albis. "This with Trif. subterraneum . . . in Tothil fields Westm." (*Trigonella purpurascens* Lam. (?) and *Trifolium subterraneum* L.) As to these determinations, see *Flora of Middlesex*, pp. 78 and 80, and C. C. Babington in Ray's Correspondence (ed. Lankester), p. 219.

P. 319.—Viscum. "Sheffeldiam adeat." (*Viscum album* L.)

THE EUROPEAN SPHAGNACEÆ

(AFTER WARNSTORF)

BY E. CHARLES HORRELL, F.L.S.

(Continued from p. 315.)

19. S. TRINITENSE C. Müll. Syn. I. 102, 1849.

Syn. *S. serratum* Aust. (1877); *S. cuspidatum* Russ. & Warnst. var. *serratum* Lesq. & James; *S. cuspidatum* Russ. & Warnst. var. *submersum* Schimp., f. *serrulatum* Schlieph.

Warnstorf has recently revived this name, and includes under it all forms of *S. cuspidatum* having serrulate branch-leaves. It would appear to be as widely distributed and as variable as *S. cuspidatum*, with which it agrees in general habit, the form of the branch-leaves, the chlorophyllose cells trapezoid in section and free on both surfaces, and the clearly differentiated stem-cortex. The uppermost branch-leaves are frequently markedly serrate, and are sometimes very long, and taper to a long fine subula, resembling that of some of the Harpidia.

Distrib. Europe; N. America. Keston Common, Kent (*Cocks*), a form resembling *S. cuspidatum* var. *falcatum*; Hambleton Hill, Kilburn, N.E. York (*Ingham*), a large brown form, resembling *S. Torreyanum* in habit.

20. S. DUSENII Russ. & Warnst. in Sitzungsber. Dorpater Naturf.-Ges. 1889, 99.

Syn. *S. cuspidatum* var. *majus* Russ. Beitr. zur Kenntn. der Torfm. 1865, 58, ex p.; *S. cuspidatum* var. *Dusenii* Jens. in litt. 1886; *S. recurvum* var. *obtusum* Limpr. Laubm. 1886, i. 132, ex p.; *S. mendocinum* Warnst. in Bot. Ver. der Prov. Branden. 1890, xxxii. 210.

Hydrophilous, generally with only the capitulum or the upper part above water. Resembling *S. cuspidatum* var. *falcatum* most closely in habit. Plants generally robust, generally green.

Stem-cortex in 2–3 layers, differentiated from the whitish, greenish, or yellowish wood-cylinder.

Stem-leaves large, isosceles-triangular or triangular-lingulate to lingulate, on the usually rounded apex weakly toothed or finely fimbriate; border wide, and generally much widened below. Hyaline cells in the apical part generally with fibrils; on the inner surface generally with membrane-gaps; on the outer surface either non-porose or with few or numerous pores on the commissures, or in the middle of the cell-wall.

Fascicles close or distant, generally of four branches; the two stronger spreading, the weaker generally directed downwards, and at an acute angle from the stem; leaves loosely arranged, generally more or less secund, frequently sickle-shaped. *Leaves* of the spreading branches large to very large, broadly lanceolate, toothed on the narrowly truncate apex; margin inrolled in the upper part; border up to six cells wide; when dry not, or more or less, undulate. Hyaline cells narrow and long, with numerous fibrils, which project far into the lumen of the cell. On the inner surface either almost entirely without pores, or in the upper part of the leaf with scattered pores in the cell-angles; on the outer surface pores very numerous, in the upper half towards the apex in one row in the middle of the cell wall, and here at times passing over into large irregular membrane-gaps, in the lower half of the leaf generally in two rows in the neighbourhood of the chlorophyllose cells or in the middle of the cell wall, 6 to 7 μ in diameter, and always with a distinct and sharp contour, sometimes with, sometimes without a border.

Chlorophyllose cells in section trapezoid and free on both surfaces.

Dioicous; male branches coloured brown in the antheridium-bearing part; perigonial bracts not differing from the sterile leaves. Perichætial bracts wide-ovate, in the lower part with chlorophyllose cells only; in the upper two-thirds to three-quarters of both kinds of cells; hyaline cells with numerous fibrils, and on the inner surface with round pores or large membrane-gaps.

Hab. Shady moorlands, frequently intermixed with *S. recurvum*.

Distrib. Europe: Germany, Styria, Russia, Finland, Denmark, Belgium, Sweden, Norway; Asia; N. America.

S. Dusenii is readily distinguished from *S. Jensenii* and *S. annulatum* by the generally more or less secund branch-leaves, the large pores, and the chlorophyllose cells free on both surfaces of the leaf.

The following are the more important varieties:—

(1) Var. *aquaticum* Warnst. Europ. Torfm. ser. *iv.* No. 368, 1894. Robust, almost completely submerged, or with the capitulum above water. Leaves of the branches of the capitulum upright and undulate when dry, so that the capitulum appears crisped.

(2) Var. *deflexum* Warnst. in Verh. Bot. Ver. Branden. 1890, xxxii. 212 (sub *S. mendocino*). Green throughout, or with the

capitulum slightly brownish. Spreading branches in and below the capitulum elongated, tapering at the apex and sharply recurved; leaves slightly elongated, when dry frequently somewhat recurved.

(3) Var. *fallax* Warnst. *l. c.* (sub *S. mendocino*). Branches of the capitulum more or less sickle-shaped, recurved, and elongated, with the leaves frequently somewhat secund.

(4) Var. *majus* (Russ.) Warnst. *l. c.* (sub *S. mendocino*). Completely submerged, very long (up to 50 cm.), without or with few pendent branches; spreading branches horizontal with, up to 10 mm. long, soft upright leaves; hyaline cells elongated, and frequently with very few pores on the outer surface. The uppermost branch-leaves frequently consist of chlorophyllose cells only in the upper part, as in *S. cuspidatum* var. *plumosum*.

(5) Var. *mollis* Warnst. Europ. Torfm. ser. *iv.* No. 369, 1894. Tufts when dry very soft, yellowish; branch-leaves closely appressed, with a tendency to being secund, generally only slightly undulate; on the inner surface almost without pores; on the outer with very numerous, generally non-bordered pores.

(6) Var. *parvifolium* Warnst. in Hedwigia, 1893, 14. Plants delicate, in compact tufts, which are only partly submerged; stem-leaves small, about ·54 to ·6 mm. long, wide at base, triangular-lingulate, non-fibrillose or somewhat fibrillose towards the rounded and weakly fimbriate apex; branch-leaves small, about 1·14 to 1·37 mm. wide, generally almost sickle-shaped and secund, border narrow; pores on the outer surface very numerous, towards the apex frequently passing over into large membrane gaps.

21. S. PULCHRUM Warnst. in Bot. Centralb. lxxxii. 1900, 42.

Syn. *S. laricinum* Spr. (Schimper, Un. Ital. in Crypt. Cheshire: Carrington Moss. leg. 1865); *S. recurvum* (P. B.) var. *pulchrum* Lindb. in Braithw. The Sphagn. 1880, 81.

Exs. Braithw. Sphagn. Brit. Exsicc. No. 48 (1877).

Plants generally very robust, of a beautiful yellow-green, light brown or dirty dark brown.

Cortex of the stout stems 2–4-layered, generally clearly differentiated from the yellowish or pale reddish wood-cylinder; more rarely in most parts of the circumference not clearly differentiated, and so apparently absent.

Stem-leaves small, broadly isosceles- to equilateral-triangular, about 90 mm. wide at the base, and almost or quite as long; generally suddenly produced above into a short apiculus; border broad, very much widened below. Hyaline cells very narrow and tube-like, generally non-fibrillose, rarely with rudiments of fibrils towards the apex; on the inner surface frequently with resorption thinnings.

Fascicles generally consisting of four branches, the two stronger spreading, the others appressed to the stem. Spreading branches thick, either short and but little thinner at the apex, or longer and distinctly acuminate; arranged in very varying directions with regard to the stem; leaves sometimes closely, sometimes loosely arranged. *Branch-leaves* broadly ovate or lanceolate, and generally almost suddenly produced into a short, narrowly truncate, small-toothed

apex, with incurved margins; when wet distinctly five-rowed, when dry either almost non-undulate or more or less undulate, slightly glossy, and generally having only the extreme apex erecto-patent or recurved. Border of 4–5 rows of cells. Hyaline cells with numerous wide fibrils; on the inner surface of the leaf in the upper half with numerous, somewhat large, non-bordered pores in all the cell-angles; on the outer surface in the upper part with small pores in the upper or lower cell-angles, and also in part in the lateral cell-angles, or frequently even several in short rows on the commissures; in the lower half of the leaves, especially towards the lateral margins, with large pores in the upper cell-angles, or not rarely with several in each cell.

Chlorophyllose cells in section equilateral- to isosceles-triangular, with the base of the triangle on the outer surface of the leaf; the height of the triangle about equal to half the diameter of the hyaline cells; hyaline cells united together for some distance, so that the chlorophyllose cells are completely enclosed on the inner surface.

Hab. In deep bogs, chiefly in the north.

Distrib. England, Sweden, Finland, Germany; N. America.

Readily distinguished from all other *recurvum*-forms by the relatively broad, shortly acuminate, five-rowed branch-leaves.

Penzance, Cornwall (*Ley*); Whixall Moss, Shropshire (*Ley*); Whitchurch, Shropshire (*Boswell*); Lythe Moss, Westmoreland (*Barnes*); Fowlshaw Moss, Westmoreland (*Stabler*); Broadgate Bog, Staveley, Westmoreland (*Stabler*); Carrington Moss, Cheshire (*Hunt*); Gull Island, Cockerham Moss, Lancashire (*Wheldon & Wilson*); Wheeldale Moor, Goathland, N.E. Yorkshire (*Anderson*); Ballygowan, Co. Down, Ireland (*Waddell*).

22. S. Torreyanum Sulliv. in Mem. Americ. Acad. Arts & Sc. New Ser. iv. 1849, 175.

Syn. *S. cuspidatum* Ehrh. var. *Torreyanum* Braithw. The Sphagn. 1880, 84, et var. *miquelonense* Ren. & Card. in Révision des Sphaignes de l'Amériq. du Nord, 1887, 17.

Plants very stately and robust, the largest form equalling *S. riparium* and *S. squarrosum*; generally greenish or dirty brownish-green, hydrophilous.

Stem-cortex in 2–3 layers, clearly differentiated from the thick wood-cylinder.

Stem-leaves in comparison to the size of the plant rather small, up to 1·14 mm. long, and at the base about 1 mm. wide, isosceles-triangular or triangular-lingulate, acute or with more obtuse, toothed apex; border very wide, much widened below. Hyaline cells in the middle above the base wide, several times septate and at times with rudimentary fibrils; in the other parts of the leaf narrow, tube-like, and either non-fibrillose or with fibrils towards the apex; on the inner surface in the upper half generally with large membrane-gaps.

Fascicles with as a rule four branches, either all of almost equal size and spreading or 1–2 distinctly thinner and appressed to the stem; the stronger branches sometimes longer, sometimes shorter and frequently sickle-shaped at the thinner apex.

Branch-leaves very large, the lower ones 2–3 mm., the upper as much as 6 mm. in length and 1–1½ mm. wide, broadly-lanceolate and the longer ones almost tubular in the upper part in consequence of the strongly inrolled margins; toothed at the narrowly truncate apex; border of 6–8 more rarely 10–15 rows of cells; when dry more or less (especially in the capitulum) undulate, somewhat squarrose-recurved, and in part almost secund and sickle-shaped. Hyaline cells narrow and elongate, with numerous fibrils which project considerably into the lumen of the cell; on the inner surface in the apical part almost quite without pores or with numerous smaller or larger non-ringed pores in almost every cell-angle; on the outer surface either only with very minute pores in the upper and lower cell-angles, or sometimes also with completely or incompletely bordered pores in the lateral cell-angles.

Dioicous; perigonial bracts much smaller than the other branch-leaves, from a narrower base broadly ovate-lanceolate, about 1·14 mm. long and at the base ·57 mm. wide; hyaline cells towards the base of the leaf non-fibrillose or incompletely fibrillose. Upper perichætial leaves very large, ovate, concave, in the lower part with chlorophyllose cells only, above with both kinds of cells; hyaline cells very narrow, vermicular, generally non-fibrillose and non-porose, more rarely in the apical half on the outer surface with scattered small pores in the upper cell-angles. Spores pale, about 26–29 μ in diameter.

Chlorophyllose cells in section broadly isosceles-triangular to trapezoid; in the lower half of the leaf completely enclosed on the inner surface by the hyaline cells which are united together for some distance so that the chlorophyllose cells are only about half the height of the hyaline ones, in the upper half trapezoid and free on both surfaces.

Hab. Floating or completely submerged in moorland pools.

Distrib. England; North America. Near Whitchurch, Shropshire (*Boswell*).

23. S. OBTUSUM Warnst. in Bot. Zeit. 1877, 478, pro parte (Russ. in Sitzungsber. d. Naturforscher-Ges. in Dorpat, 1889).

Syn. *S. cuspidatum* var. *majus* Russ. pro parte Beitr. 58, 1865; *S. intermedium* var. *riparium* pro parte Braithw. The Sphagnaceæ, 80, 1880; *S. recurvum* var. *obtusum* pro parte Limpr. Laubm. i. 132, 1886.

In swamps or partly immersed in water. Stem generally very robust and equalling in stature *S. riparium*; above green, yellow-green or brownish.

Stem-cortex irregularly 2–3-layered and generally not clearly differentiated from the thick wood-cylinder; at times apparently absent.

Stem-leaves of medium size to large, triangular-lingulate to lingulate, fimbriate at the rounded apex owing to the reabsorption of the cell-membrane on both sides of the leaf, but never deeply cleft; border much widened below; hyaline cells almost without exception without fibrils.

Fascicles according to the habitat closer together or more dis-

tant, of 4–5 branches; the 2–3 stronger curved and spreading, the others pendent. Leaves of the two kinds of branches not differing in size; those of the stronger branches large, broad-lanceolate, more or less longly acuminate, toothed at the narrowly truncate apex and with inrolled margin; border narrow, of 3–4 rows of cells; hyaline cells with numerous fibrils which project considerably into the cavity of the cell; on the inner surface generally almost entirely without pores, more rarely with non-bordered pores in the cell-angles in the apical part of the leaf; on the outer surface either without pores in the upper cell-angles or with extremely small pores in the upper cell-angles; in the middle part of the leaf and especially near the commissures always with small pores, about 2 μ in diameter, rarely somewhat larger; these have always an indistinct outline, are arranged in one or more rows, and only become visible on strongly staining the cells. These pores are sometimes only in the basal part of the leaf near the lateral margins, sometimes in the entire lower part of the leaf, and sometimes on the whole leaf surface. Pores on the leaves of the pendent branches similar. When dry the leaves have a faint metallic lustre and are either closely imbricate and not at all undulate, or are more loosely leaved and slightly undulate.

Chlorophyllose cells in section triangular-oval, inserted between the hyaline cells on the outer surface and here free; on the inner surface completely enclosed by the hyaline cells which are united together for some distance so that the chlorophyllose cells are only about half the height of the hyaline ones; hyaline cells almost flat on the outer surface.

Dioicous; male branches in the antheridium-bearing part rusty-brown; perigonial bracts longly-ovate, much shorter than those of the sterile branches; with a short, truncate and toothed apex; margin inrolled; chlorophyllose cells below the leaf-middle yellow-brown. Hyaline cells on the outer surface with only small pores at the apex and scattered bordered pores in the lateral cell-angles. Perichætial leaves as in *S. recurvum*.

Distrib. Throughout middle and northern Europe; Austria, Germany, Russia, Finland, Norway, Sweden, Denmark, Belgium, France, England. Cockerham Moss, West Lancashire (*Wilson & Wheldon*, June, 1900).

(1) Var. *aquaticum* Warnst. in Bot. Ver. Prov. Brandenburg, 1890, xxxii. 224. Less robust than var. *pseudo-Lindbergii*; generally the uppermost part alone above water. Fascicles distant, spreading branches neatly sickle-shaped, recurved; leaves loosely arranged, large, when dry, especially in the capitulum, distinctly undulate.

(2) Var. *pseudo-Lindbergii* (Jens.) Warnst. *l. c.* The most robust of all forms, equalling in size a large *S. riparium*. Fascicles sometimes closely, sometimes distantly arranged; spreading branches long and thick; in the upper part of the stem gradually or sharply recurved; branch-leaves large, closely set, more or less distinctly 5-rowed, when dry but little undulate.

(3) Var. *tenellum* Warnst. *l. c.* Not more robust than a typical *S. recurvum*. Plants pale yellowish-green or green, forming loose

tufts in bogs. Fascicles sometimes very closely, sometimes more distantly arranged; spreading branches very thin, short and recurved; leaves closely set, small, when dry almost or quite non-undulate with recurved apex, in part more or less secund.

(4) Var. *teres* Warnst. *l. c.* Plants robust, when dry somewhat rigid; fascicles towards the apex very closely set, forming a dense roundish capitulum; spreading branches long and gradually tapering to a very thin apex; leaves closely arranged all round the branch, with only the apex or the entire upper half erecto-patent to almost squarrose, somewhat undulate.

24. S. RECURVUM Russ. & Warnst. Sitzungsber. d. Naturforscher-Ges. in Dorpat (1889).

Syn. *S. intermedium* Hoffm. (ex p.) Deutsch. Fl. ii. 22, 1795.

Exsicc. Braithw. Sphagn. Brit. Exsicc. no. 47 (1877).

Inhabiting swamps, rarely completely submerged in water. Plants sometimes robust, sometimes more delicate to very slender; green, whitish, yellow-green to brownish, rarely the capitulum reddish or dirty-violet.

Wood-cylinder whitish, greenish, yellowish or reddish.

Stem-cortex generally absent.

Stem-leaves generally small, equilateral to shortly isosceles-triangular, acute or obtuse, sometimes almost short-lingulate and then with a few membrane-gaps and fibrils at the apex. Border broad and much widened below; hyaline cells in the upper part generally non-fibrillose, more rarely with fibrils and a few pores or membrane-gaps on the inner surface.

Fascicles distant or closer, with 4–5 branches, the two stronger branches spreading, the other weaker ones generally closely appressed to the stem. *Leaves* of the spreading branches larger or smaller to very small, broadly or narrowly ovate-lanceolate; above produced into a shorter or longer, narrowly truncate toothed apex; margin above inrolled; border generally narrow 2–4 (very rarely 5–6) rows of cells wide; when dry almost always undulate; rarely somewhat secund and sickle-shaped; without metallic lustre. Hyaline cells narrow and long, with numerous fibrils, which project considerably into the cavity of the cell; on the inner side almost always, especially in the apical half of the leaf, with numerous larger or smaller non-bordered pores in the cell-angles; on the outer side in the upper half of the leaf with small pores in the upper cell-angles only; towards the lateral margins on the outer surface the pores are almost always larger and not rarely there are several in the upper part of each cell; here also they frequently exactly cover the pores on the inner surface, so that complete perforation of the leaf ensues. Leaves of the pendent branches much smaller, either agreeing in anatomical structure with the others or well differentiated; in the latter case they have on the outer surface, near the apex or near the lateral margins, large membrane-gaps in the upper cell-angles, as in *S. riparium*.

Chlorophyllose cells in section in the basal half of the leaf triangular and completely enclosed on the inner surface by the hyaline cells, which are not united together for any appreciable distance.

Dioicous; male branches in the antheridium-bearing part rust-red to dark brown; perigonial bracts differentiated, broadly-ovate, with shortly produced apex. Perichætial bracts large, broadly-ovate; in the basal half formed of broad, long, rectangular chlorophyllose cells only, in the upper half of both kinds of cells; towards the lateral margin the cells become gradually narrower and form an indefinite broad border; the apex itself formed of small, thick-walled chlorophyllose cells only; hyaline cells usually without fibrils and pores. Spores sulphur-coloured with membrane folds or rusty-brown without folds, 25 μ in diameter.

Hab. Widely distributed in both lowlands and mountainous regions.

Distrib. Throughout Europe; Asia; North and South America; Oceania. Hole Common, near Lyme Regis, Dorset (*Miss Lister*); Mallowdale Fell, W. Lancashire (*Wheldon & Wilson*); Loch Knock, Islay (*Gilmour*); Cwm Moch, Merioneth (*Jones & Horrell*).

Very numerous varieties have been described, of which the following are the most important:—

(1) Var. *amblyphyllum* Warnst. in Bot. Ver. Prov. Branden. 1890, xxxii. 216. Plants sometimes robust, sometimes delicate, whitish or yellowish, habit varying much according to the habitat. Stem-cortex absent or more or less distinctly differentiated from the green, whitish or yellowish wood-cylinder. Stem-leaves small, triangular-lingulate to lingulate, at the rounded apex with resorption of the cell-membrane on both surfaces and so more or less fimbriate, but not deeply divided; generally non-fibrillose, rarely with fibrils in the apical part. Branch-leaves when dry more or less undulate, longly acuminate, pore formation in the leaves of the two kinds of branches differing little, on the outer surface almost with pores in the upper cell-angles only, the pores towards the lateral margins frequently larger.

A very common form, differing from the var. *mucronatum* by the rounded and fimbriate apex of the stem-leaves. Robust forms are distinguished from *S. obtusum* by the pores in the branch-leaves, which in that species are smaller with ill-defined outlines.

Brookwood, Surrey (*Sherrin*); Harrogate, W. Yorkshire (*Cocks*); Burnham Common, Bucks (*Sherrin*); Artro Valley, Merionethshire (*Jones*); Worston Moor, N.E. Lancashire (*Lewis*).

(2) Var. *mucronatum* Warnst. *l. c.* p. 217. In size, habit, and colour as variable as the var. *amblyphyllum*, and only differing from this in the stem-leaves. Stem-leaves generally equilateral- to isosceles-triangular; in the former case acute, and without any resorption of the upper cell-walls, and generally non-fibrillose, more rarely with fibrils in the upper part; in the latter case larger, toothed on the frequently truncate apex, and not rarely having the border less widened below, and the cells fibrillose to below the middle of the leaf. Branch-leaves sometimes strongly, sometimes weakly undulate, very seldom, and especially in submerged forms, quite rigid. Pore-formation as in var. *amblyphyllum*. Very common.

Brookwood, Surrey (*Sherrin*); Oakmere, Cheshire (*Wilson*); Wybunbury Bog, Cheshire (*Wilson*); Tilgate Forest, Sussex (*Horrell*);

Widdy Bank Fell, Teesdale, Durham (*Horrell*); Corriesgill's Head, Arran (*Ley*); Islay (*Gilmour*).

25. S. PARVIFOLIUM Warnst. in Bot. Centralbl. lxxxii. 1900, 67.

Syn. *S. recurvum* var. *parvifolium* Warnst. in Flora, 1883, 374; *S. intermedium* Lindb. var. *angustifolium* Jens.; *S. angustifolium* subspec. nov. Jensen in De Danske Sphagnum-Arten, 1890, 104.

Plants generally very slender, pale-, greyish-, to yellow-green, rarely (especially in the capitulum) brownish or a beautiful reddish brown.

Stem-cortex generally apparently absent, not or scarcely differentiated from the wood-cylinder.

Stem-leaves very small, ·5 mm. long, and about the same width at the base, and hence equilateral-triangular or triangular-lingulate, with obtuse somewhat fimbriate apex; border widened below. Hyaline cells non-porose, and generally non-fibrillose, more rarely with fibrils towards the apex.

Branch-leaves small, but little over 1 mm. long and ·34–·4 mm. broad, narrowly lanceolate, border narrow, margin inrolled only in the apical part; when dry generally not at all undulate, but closely imbricate, and with only the extreme apices frequently recurved, more rarely weakly undulate, or especially in the capitulum distinctly undulate. Leaves of the spreading branches on the inner surface with numerous, round, non-ringed pores in the cell-angles from the apex to the base; on the outer surface towards the apex with small strongly ringed or in part incompletely ringed pores in the cell-angles or on the commissures, in the basal half near the lateral margins with large pores in the upper cell-angles. Leaves of the pendent branches on the outer surface in the apical half with small pores in the lateral and lower cell-angles, and with large membrane-gaps in the upper cell-angles which frequently are immediately above the pores on the inner surface, so that complete perforation of the leaf results. Perigonial bracts differentiated, ovate-lanceolate to oblong-lanceolate, from a narrower base widened to the middle, and then produced into a short, truncate, and toothed apex; in the lower half light brown, and here generally non-fibrillose. Always smaller than the other branch-leaves.

Chlorophyllose cells in section triangular, with the base of the triangle free on the outer surface of the leaf; on the inner surface completely enclosed by the more concave hyaline cells, which are, however, not united together for an appreciable distance.

Distrib. Widely distributed in Europe and North America. Holt, E. Norfolk (*Burrell*); Widdy Bank Fell, Teesdale, Durham (*Horrell*).

26. S. BALTICUM Russ. in Sitzungsber. der Naturforscher-Ges. in Dorpat (as subspec. of *S. recurvum*) (1889).

Syn. *S. cuspidatum* Ehrh. var. *mollissimum* Russ. Beitr. 1865, 61; *S. cuspidatum* var. *brevifolium* Lindb. in Braithw. The Sphagn. 1880, 84; *S. laricinum* Angstr. ex p.; *S. recurvum* (P. B.) var. *mollissimum* Russ. apud Warnstorf in Verh. des Bot. Ver. der Prov. Brandenb. xxxii. 1890, 221.

Plants delicate to robust, and in denser or looser, very soft tufts; light brown or yellowish green; small forms closely resembling *S. molluscum*, with which it sometimes grows intermixed.

Stem-cortex of 2–3 layers; cells of one-half the circumference, much wider than in the other, all thick-walled, but clearly differentiated all round from the pale or yellowish wood-cylinder.

Stem-leaves small, up to 90 mm. long, and in the middle 57 mm. wide, from the generally narrower base oval or lingulate to triangular-lingulate; at the apex generally rounded; border generally of almost equal width throughout; margin more or less inrolled. Hyaline cells rarely divided by an oblique cross wall; towards the lateral margin becoming regularly narrower and vermicular, above shorter and wider, rhomboid and almost always with stout fibrils; on the inner surface with numerous large non-bordered pores, which are as wide as the hyaline cells, and are placed between the fibrils; on the outer surface, on the contrary, with small, frequently incompletely bordered pores in the cell-angles in the upper half of the leaf only.

Fascicles of 3–4 branches, which are either all similar, or only two are stronger and spreading, the other weaker branch being closely appressed to the stem. Leaves of the spreading branches small, up to 1·2 mm. long, and about ½ mm. wide, lanceolate, toothed on the truncate apex; border narrow; margin incurved for some distance from the apex; when dry almost not at all undulate, closely imbricate, or more or less secund. Hyaline cells with numerous fibrils; on the inner surface with numerous large non-bordered pores in the middle of the cell-walls, between the fibrils; on the outer surface with small ringed pores in all the cell-angles, but also frequently in short rows on the commissures; the pores in the upper cell-angles in the basal part of the leaf near the lateral margins larger and frequently immediately opposite the pores on the inner surface. Upper perichætial bracts large, wide ovate, very concave, in the lower half with chlorophyllose cells only, in the upper part with both kinds of cells; hyaline cells very narrow, vermicular, non-fibrillose, or also with numerous fibrils; towards the apex on both sides sometimes with small membrane-gaps, otherwise without pores.

Chlorophyllose cells in section isosceles-triangular; the base of the triangle situated on the outer surface of the leaf; completely enclosed on the inner surface by the strongly convex hyaline cells, of which the walls are here not united together for any appreciable distance.

Distrib. Norway, Lapland, Finland, Germany, Scotland, and England; North America.

Hab. On high moorlands in company with *S. rubellum* and *S. molluscum*.

27. S. ANNULATUM Lindb. fil. in litt. ad Warnstorf et apud Soc. pro Fauna et Flora fenn. 15, v. 98, non Warnst.

Plants robust, and resembling in habit and stature *S. obtusum*, or more delicate and weaker; capitulum a beautiful brownish colour.

Stem-cortex apparently absent, not differentiated from the yellowish wood-cylinder.

Stem-leaves rather large, triangular-lingulate, about 1 mm. long, and about the same width at the base, somewhat fimbriate at the rounded apex through resorption of the upper hyaline cell-walls; border wide, much widened below. Hyaline cells in the lower and middle part of the leaf narrow, wider and shorter above, non-septate, non-porose on both sides, but in the middle of the upper part of the leaf with rudimentary or in part completely developed fibrils, rarely quite without fibrils.

Fascicles generally with four branches; two stronger, gradually tapering at the apex, and about 15 mm. long, are spreading, the other weaker branches appressed to the stem. *Branch-leaves* imbricate, never secund, when dry not or weakly undulate, not shining, lanceolate, about 2·15 mm. long and ·86 mm. wide, with small teeth on the narrowly truncate apex; border narrow, of 3–4 rows of cells, margin entire, widely inrolled. Hyaline cells with very numerous fibrils, on the inner surface quite without pores, or in certain forms with few very small pores with indistinct contour (as in *S. obtusum*), and scattered very small strongly ringed pores; on the entire outer surface with extremely numerous small pores, which are generally in two rows on the commissures or in the middle of the cell-wall, towards the apex sometimes strongly bordered and in rows like strings of pearls, the true pores sometimes interrupted by pseudo-pores.

Chlorophyllose cells in section triangular, with the base of the triangle free on the outer surface, on the inner surface completely enclosed by the hyaline cells, which are only united together for a short distance.

Distrib. In company with *S. Jensenii*, *S. obtusum*, *S. recurvum* var. *amblyphyllum*, *S. platyphyllum*, and *S. subsecundum* in Finland and Russia.

S. annulatum is distinguished from *S. Dusenii* by the absence of stem-cortex, and by the chlorophyllose cells being completely enclosed on the inner surface of the leaf; and from *S. Jensenii* by the very few pores on the inner surface of the leaf and the absence of cortical cells.

28. S. Jensenii Lindb. fil. in litt. ad Jensen et apud Soc. pro Fauna et Flora fenn. 7, x. 99.

Syn. *S. annulatum* Warnst. (non Lindb. fil.), p. p.

Almost always brown. Stem-cortex distinctly differentiated. Branch-leaves never secund. Pores on the outer surface of the branch-leaves very numerous, generally in two rows in the middle of the cell-wall, never passing over into membrane-gaps, smaller than in *S. Dusenii*, towards the apex with bordered pores on the commissures; on the inner surface with very numerous non-bordered pores, generally not close to the commissures, and usually two between each fibril. Chlorophyllose cells completely enclosed on the inner surface.

Distrib. Norway, Sweden, Finland, Russia.

S. Jensenii is readily distinguished from *S. Dusenii* by the

numerous pores on the inner surface of the branch-leaves, and by the completely enclosed chlorophyllose cells in the section of a branch-leaf; and from *S. annulatum* by the distinct stem-cortex, and the numerous pores on the inner surface of the branch-leaf.

29. S. MOLLUSCUM Bruch in Flora, 1825, 635.

Syn. *S. tenellum* (Ehrh.) Lindb. in Œfvers V.-Ak. Förh. 19, p. 142, No. 13 (1862).

Exsicc. Braithw. Sphagn. Brit. Exsicc. Nos. 11 and 12.

Tufts very soft, sometimes dense, sometimes looser; above grey or a beautiful yellow-green, rarely with the capitulum pale reddish; when growing in water up to 25 cm. long; plants always very delicate.

Stem-cortex of 2–3 layers, formed of narrow or medium-sized thin-walled, non-porose cells.

Wood-cylinder whitish, greenish, or yellowish.

Stem-leaves large, triangular-oval to almost lingulate, generally with the margin inrolled towards the weakly-toothed apex; when dry shining; border rather wide, more or less widened below; hyaline cells generally fibrillose to the middle, rarely lower; on the inner surface towards the apex with large pores or membrane-gaps in the upper cell-angles, on the outer surface with small pores in the upper and lateral cell-angles, as in the branch-leaves.

Fascicles sometimes distant, sometimes very close together, of 2–4 branches, either 1–2 branches spreading and the others pendent, or all spreading, all relatively short; leaves loosely or closely arranged all round the branch. Retort-cells of branches very large, with recurved neck; pore of the retort-cell colourless, or with a yellowish border. *Branch-leaves* small, wide-oval or elongate-ovate, the narrowly bordered margin widely inrolled; at the narrowly truncate apex finely toothed; very concave; never distinctly secund, when dry not undulate; the upper hyaline cells widely rhomboid, all with numerous fibrils which project far into the lumen of the cell; pores on the inner surface almost confined to the upper cell-angles, more rarely also in the lower and the lateral angles, large, weakly or not bordered; in the basal cells with one or more large pores in the upper cell-angles; on the whole outer surface with small pores in almost every cell-angle, which become gradually larger and more weakly ringed towards the base; the pores in the upper cell-angles on the outer surface in the upper part of the leaf exactly cover pores on the inner surface to a greater or less extent. Pores in the leaves of the pendent branches generally in each upper cell-angle on the outer surface, rarely also in the lateral angles.

Chlorophyllose cells in section triangular to trapezoid, inserted between the flat hyaline cells on the outer surface of the leaf, and here free, on the inner surface either completely enclosed by the strongly convex hyaline cells or free here also.

Polyoicous; male branches short and thick, later becoming elongated; of a beautiful yellow or yellow-brown colour; perigonial bracts resembling the sterile leaves in form and structure. Perichætial bracts large, ovate, concave, fine-toothed on the truncate

apex; the broadly bordered margin inrolled; the upper bracts formed of both kinds of cells; the hyaline cells in the apical part of the leaf rhomboid, all or only some of them with fibrils, and similar pores on both sides to those on the stem-leaves; at times septate here and there; the apex of the lower bracts generally with only thick-walled, narrow, short chlorophyllose cells. Capsule small, when ripe yellowish brown, urn-shaped. Spores sulphur-coloured, smooth, 38 μ in diameter.

Hab. Wet places on heaths and moorlands both in the plains and in hilly regions, frequently intermixed with other bog-mosses.

Distrib. Germany, Austria, Holland, Belgium, France, Denmark, Norway, Sweden, Finland, Russia; North America. Brookwood, Surrey (*Monington & Horrell*); Champernhay Marsh, Wooton, W. Dorset (*Miss Lister*); Witherslack Moss, Cheshire (*Ley*); Penzance, Cornwall (*Ley*); Keston Common, Kent (*Horrell*); Widdy Bank Fell, Teesdale, Durham (*Horrell*); Silchester Common, N. Hants (*Wilson*); Ulpha Moss, Westmoreland (*West*); Cennant Llenyrch, Merionethshire (*Jones*); Naut Pedor, Carmarthenshire (*Ley*).

This very pretty species varies little, the forms being directly due to the character of the habitat. Of these Warnstorf enumerates the following:—f. *immersa*, Schimp. Completely submerged and reaching to 25 cm. long, branches distant, grey- or yellow-green, fruit-bearing branches often several centimetres long, and situated far below the capitulum.—f. *compacta* Warnst. growing in dry places, forms very compact tufts, branches short and closely arranged.—f. *gracile* Warnst. is a very delicate weak form with small distant branches, growing in damp places.—f. *robusta* Warnst. is very robust and large. This I have gathered on Roseberry Topping, N.E. Yorkshire.—f. *suberecta* Grav. is homalo- to ano-cladous.—f. *stricta* Röll. is anocladous, and f. *longifolia* Lindb. is a young form with incompletely differentiated branch and stem-leaves.

§ IV. Sphagna polyclada Warnst.

This section contains only the single species *S. Wulfianum* Girgens., remarkable for the large number of branches (7–13) in each fascicle.

30. S. Wulfianum Girgens. in Archiv für Naturk. Liv. Est. & Kurlands, ser. 2, Bd. ii. 173, 1860.

Exsicc. Braithw. Sphagn. Brit. Exsicc. No. 46 (1877) (Addend. Exoticum).

Plants robust, with dense, large capitulum, pale green to brown, with a reddish tinge owing to the numerous male branches. Stems rigid and stout, up to 20 cm. high, 2–4 times divided.

Wood-cylinder dark red.

Stem-cortex irregularly 2–3-layered; inner cells thick-walled, red; outer, thin-walled.

Stem-leaves small, triangular-lingulate, with narrow border, widened below; hyaline cells several times septate, above generally with scattered pores.

Fascicles closely or distantly arranged, with 7–13 branches, of which 3–5 are horizontal, short and clavate, with thin apices. *Leaves* of the spreading branches from an oval base almost suddenly produced at the middle into an elongated apex, border narrow; on the inner surface almost entirely without pores; on the outer surface in the apical part with very small strongly ringed pores in all the cell-angles; below with larger round pores. Leaves of the pendent branches in the upper two-thirds with large pores in the upper and lateral cell-angles on both surfaces.

Chlorophyllose cells in section median; in the upper part of the leaf elliptical, and completely enclosed on both surfaces; in the basal part barrel-shaped to rectangular, and free on both surfaces. Hyaline cells on the inner surface, where they are united to the chlorophyllose cells, weakly papillose.

Hab. Wet pine-woods.

Distrib. Russia, Finland, Sweden; Asia; N. America.

This very fine and distinct species is readily recognized by the numerous branches in each fascicle, as well as by their clavate form.

The following varieties have been described.

(1) Var. *squarrosulum* Russ. Beitr. zur Kenntn. der Torfm. 1865–66. Spreading branches longer, with squarrose leaves, having more numerous pores.

(2) Var. *versicolor* Warnst. Bot. Gaz. xv. 225, 1890. Colour, especially in the capitulum, a beautiful rose- or violet-red, mixed with yellowish-green.

(3) Var. *viride* Warnst. *l. c.* Grass-green, whitish below.

§ v. Sphagna rigida Schimp.

Branch-leaves large, generally from a broad-ovate base, above the middle suddenly (rarely gradually) contracted into a longer or shorter, broadly truncate and toothed, frequently squarrose apex; with a remarkably narrow toothed border, margin widely inrolled. Hyaline cells wide, rhomboid, with numerous fibrils, where united with the chlorophyllose cells either smooth or papillose; pore formation various, but the pores generally more numerous on the outer side, and generally there in rows on the commissures; on the inner surface most numerous near the lateral margins. Chlorophyllose cells in section elliptic, generally nearer the outer surface of the leaf, more rarely centric, either completely enclosed on both surfaces of the leaf, or with the strongly thickened outer wall free on outer surface. Stem-leaves sometimes small and triangular to triangular-lingulate; sometimes of medium size; sometimes very large and lingulate to almost spatulate, with a more or less distinct hyaline margin, especially on the upper margin and at the apex; apex sometimes fimbriate. Cortical cells of the stem usually in several (rarely in one) layers, thin-walled and non-fibrillose, but on the outer wall frequently with a single large pore, and on the inner walls with small pores. Plants, when dry, generally rigid and slightly glossy; whitish, yellowish, brownish, bluish-green or in the capitulum dirty violet, never purple.

This small section, of which only one species inhabits Europe, comprises about fourteen species.

31. S. COMPACTUM DC. Fl. Franc. ed. 3, ii. 443, 1805.

Syn. *S. compactum* var. *rigidum* Bryol. germ. i. 14, 1823; *S. rigidum* Schimp. Entw.-gesch. 1858, 65.

Exsicc. Braithw. Sphagn. Brit. Exsicc. Nos. 23, 24, 25 (1877).

Tufts shorter or deeper, denser or looser, brownish, variegated or bluish-green. Branches closely or distantly arranged, when dry very rigid and fragile.

Wood-cylinder in the middle of the stem always dark brownish black.

Stem-cortex in 2–3 layers of irregular cells, of which the inner have a few scattered minute pores.

Stem-leaves very small, from a wide base shortly triangular, rounded or broadly truncate at the apex, and here generally fimbriate; middle cells wide; border very wide; non-fibrillose and non-porose.

Fascicles generally near together, more rarely distant, of 3–4 shorter or longer branches, of which 1–2 are spreading. *Leaves* generally distinctly quinquefarious, rarely somewhat imbricate, generally erecto-patent or squarrose, large, broadly-ovate to oblong, very concave, with the margin inrolled to the base, broadly-truncate, and with 5–6 teeth at the apex; border very narrow. Pores on the outer surface large and round, numerous along the commissures; on the inner surface chiefly in the cell-angles.

Chlorophyllose cells in section not median, nearer the outer surface, elliptical and enclosed on both surfaces by the hyaline cells, which are united together for some distance; non-papillose.

Monoicous; male branches generally pendent, not differing in form from the sterile branches; when ripe almost golden-yellow. Perichætial bracts very large, ovate-lanceolate, longly acuminate at the apex and somewhat secund; cells near the apex very long, the others resembling the cells of the *branch*-leaves; border almost absent. Spores yellow-brown, 32–35 μ in diameter.

Hab. Heaths and moorlands, pine-woods, and wet mountain slopes.

Distrib. Widely distributed throughout Central and Western Europe from Italy to Island; Asia; Africa; N. America.

There are three main varieties.

(1) Var. *squarrosum* Russ. Beitr. zur Kenntn. der Torfm. 1865, 77. Tufts lax and deep, greyish- or bluish-green. Spreading branches horizontal, or more rarely recurved; all leaves loosely imbricate and squarrose.

Brookwood, Surrey (*Sherrin*); Riccall, E. Yorkshire (*West*).

(2) Var. *subquarrosum* Warnst. in Hedwigia, 1888, 271. Most of the leaves erecto-patent, but few recurved.

Langdale, Westmoreland (*Barnes* in Braithw. Sphagn. Brit. Exsicc. No. 24; sub nom. *S. rigidum* var. *squarrosum*, teste Warnstorf); Brookwood, Surrey (*Monington & Horrell*).

(3) Var. *imbricatum* Warnst. in Bot. Gaz. xv. 226, 1890. Branch-leaves closely imbricate. Tufts usually very short and dense, with short and much-crowded branches; colour various.

Widdy Bank Fell, Teesdale, Durham (*Horrell*); Dalfroo Bog, near Strachan, Kincardine (*Sim*) (in Brathw. Sphagn. Brit. Exsicc. No. 25; sub nomine *S. rigidum* var. *compactum*); Glen Dole, Clova, Forfar (*Miss Barton*); Moidart, Westerness (*Macvicar*); Aviemore, Easterness (*Macvicar*).

§ VI. Sphagna truncata Warnst.

This section contains only a single species, native of Northern Europe and Siberia.

32. S. Angstroemii Hartm. Skand. Fl. ed. 7, 399, 1858.

Syn. *S. insulosum* Angstr.

Exsicc. Braithw. Sphagn. Brit. Exsicc. No. 22 (1877) (Addend. exoticum).

Resembling in habit small forms of *S. cymbifolium*. *Tufts* soft, pale greenish or yellowish-brown.

Wood-cylinder yellowish.

Stem-cortex of 3–4 layers of irregular, rather wide non-porose cells.

Stem-leaves large, about twice as long as wide, lingulate (resembling those of *S. Girgensohnii*), fimbriate on the broad rounded apex; border much widened below; non-porose and non-fibrillose, or with delicate fibrils in the upper cells.

Fascicles of 3–5 branches, of which 1–2 are spreading, and the others appressed to the stem. *Branch-leaves* large, from a narrower base broadly-ovate, with 6–10 teeth on the broadly truncate apex; border almost wanting; pores on the outer surface generally in the cell-angles, near the lateral margins numerous along the commissures, in the basal part few; on the inner surface only near the apex and towards the lateral margins.

Chlorophyllose cells in section median, barrel-shaped to almost rectangular, and with their strongly-thickened walls free on both sides of the leaf; non-papillose.

Dioicous; male branches short, oval and pale green; perigonial bracts roundish-oval, in the lower part with wide non-porose cells, which are not rarely also without fibrils. Perichætial bracts yellow, broadly-oblong, obtuse and concave; cells narrow, non-fibrillose; border wide. Spores rust-red.

Hab. Deep bogs in northern latitudes.

Distrib. Finland, Russia, Scandinavia, Spitzbergen; Siberia.

(To be continued.)

NOTES ON CORNISH PLANTS.

By Fred. Hamilton Davey.

Notwithstanding the attention which Cornwall has received at the hands of a continuous line of botanists since the time of Ray, the investigations carried out last year and this by Mr. A. O. Hume, C.B., and myself, for our proposed Flora of the county, have shown that much may be done in some comparatively unexplored districts. In these notes I shall content myself with references to our own personal work, leaving new and interesting records by our numerous co-workers for our "Prodromus," which we trust we shall be able to print in time for next season's work.

Sisymbrium pannonicum Jacq. Until this year this has only been recorded from the Eastern Green, Penzance, where it was found several years ago by the late Mr. W. A. Glasson. Quite a colony is now flourishing at Devoran, a little port at the head of one of the arms of the Fal. That it was originally introduced with ballast or grain there can be no doubt; but the plant is now growing quite away from the ballast heaps, and appears to have taken a permanent hold of the place. Close at hand there is a very fine lot of *Lepidium ruderale* Linn.

Brassica Cheiranthus Vill. We have found this *Brassica* fairly plentiful along the sands at Par, and Mr. R. V. Tellam reports it from Pentewan, a little watering-place a few miles farther west.

Claytonia perfoliata Donn. First appeared at Pengreep, in the parish of Gwennap, during the early summer of 1898, being, as I suspect, introduced from Surrey with some rhododendrons. This year a great many plants have flowered there, and others have been found at Perranporth, on the north coast, fourteen miles distant.

Trifolium ochroleucon Huds. Has been growing very freely at Falmouth Docks, where it was first noticed by Mr. J. Lawson.

Hippurus vulgaris L. Until last autumn there appears to have been but one record for the county for this widely-distributed species: during the early years of this century it was found at Marazion Marsh by a Canon Rogers. In September last Mr. Hume gathered a single specimen on a moor a mile to the west of Penryn, in the parish of Mabe.

Eryngium campestre L. We have had our attention directed to two distinct groups of this rarity in the Looe district. As far as we are able to judge, it is genuinely native; it has certainly been known there for over thirty years.

Scabiosa maritima L. I found this plant on the cliffs at Newquay in 1896, since which time it has extended its boundary by a good many feet.

Matricaria discoidea DC. This North American and Asiatic plant, which appeared at Falmouth Docks less than a decade ago, is now the commonest of plants there, and has wandered south, west, and north into the parishes of Budock, Mabe, St. Gluvias, Stithians, Perranarworthal, Gwennap, and Mylor, in each of which

it is a frequent object by the wayside. This summer I have found it by the score quite eight miles north of Falmouth. Around Falmouth Docks and railway station it grows in many places to the entire exclusion of other plants.

Omphalodes verna Moench. Has been growing in the woods at Pengreep for quite a quarter of a century in wild luxuriance, its acres of blue flowers outrivalling the forget-me-not and the alkanet. It has also established itself by the Falmouth-Truro turnpike road, near Kea Church.

Mimulus Langsdorffii Donn. Grows in great profusion at Trebarwith, on the north coast, and sparingly at Hessenford, on the south. But perhaps it is most at home in a ravine at Zennor, near St. Ives. I have had magnificent plants sent me from that place this summer, together with a photograph of the *Mimulus*-decked ravine, accompanied by a letter explaining that the plant swarms there by tens of thousands. — *M. moschatus* Dougl. Has been growing in two places in the lower portion of the Kennall Valley far away from house and garden for twenty years.

Hippophae rhamnoides L., unrecorded for Cornwall, I found at Devoran a few weeks ago.

Euphorbia platyphyllos Linn., which was recorded for Torpoint in the early forties by Hore and Johns, but which always eluded Briggs, I have collected at Tremough, near Penryn.

Salix purpurea L. Curiously enough, none of my correspondents has been able to furnish records for this widely dispersed willow. I have found the male plant at Lanner, and the female at Pulla, both localities in the parish of Gwennap.

Allium Ampeloprasum var. *Babingtonii* (Borr.). In large quantities at St. Anthony-in-Roseland.—*A. vineale* var. *bulbiferum* Syme. In the neighbourhood of Penryn and Falmouth.

Zannichellia pedunculata Reichb. Occurs in large quantities in the upper part of the canal in the East Looe Valley. New to Cornwall.

Phalaris aquatica Desf. In June last I found this native of South Europe on the embankment between Falmouth station and the signal-box. A few weeks later, when botanizing near Perranwell station, seven miles north of Falmouth, I came upon another very large group in a rather ill-conditioned garden. It will be interesting to watch whether the plant shows any signs of permanence in either place.

In conclusion, I would ask all who have been working at the botany of Cornwall to join us in making our proposed handbook as complete as possible. My address is Ponsanooth, Perranwell Station, Cornwall.

REPORT OF DEPARTMENT OF BOTANY, BRITISH MUSEUM, 1899.

By George Murray, F.R.S.

The additions to the collections by presentation have consisted of:—8 plants from Australia and New Guinea, from F. Manson Bailey; specimens of a *Senecio* from Prof. Perceval Wright; 327 plants from Tropical Africa, from Lord Delamere; 1239 plants from South Africa, from Major Wolley Dod; 7 Orchids from Sir Trevor Lawrence; specimens of *Schimmelia** from E. M. Holmes; 188 plants from Arabia, Prov. Oman, from Surg. Lieut.-Col. Dr. A. S. G. Jayakar; 15 plants from California and Oregon, from H. E. Brown; 71 phanerogams and 6 cryptogams from Falkland Islands, from Mrs. E. Nichol; 40 specimens of fruits, barks, woods, &c., and 2 cryptogams from the Caroline Islands, by F. W. Christian; specimens of *Tumboa* from Dr. William Newton; 60 phanerogams and 1 cryptogam from Soudan, from Major R. H. Penton; 120 flowering plants, and 47 Ferns, from Jamaica, from W. Fawcett; 100 phanerogams and 62 cryptogams from West Indies, by the West Indian (Natural History) Exploration Committee; 223 phanerogams and 4 cryptogams from Chinese Turkestan, from Capt. H. H. P. Deasey; 100 specimens from India, from J. F. Duthie; specimen of *Barneoudia* from the Andes, from Miss M. J. Elliott; 25 specimens of Brazilian woods from Mrs. Henry Gale; 12 specimens of Chinese plants from J. D. La Touche and C. B. Rickett; 55 plants from North Mexico, from Prof. Robinson; 79 plants from Malay Peninsula, from H. N. Ridley; 2 cones of *Pinus* from Prof. Hans Schinz; exhibition specimen of *Mimosa* from Prof. Stewart; specimen of *Mentzelia* from C. G. Richards; specimen of *Gloriosa* from Gambia, from S. Arthur Sewell; fruit of *Eriodendron* from A. Blayney Percival; specimen of *Centaurea* from Portugal, from Rev. E. Armitage; 93 plants from Porto Rico, from Dr. Urban; 19 Orchids, 2 specimens of cultivated Junipers and *Podocarpus* from Messrs. Veitch; 5 Orchids from J. Sparkes; 7 Orchids from Messrs. Sander; 12 Marine Algæ from Cape Agulhas, by Miss Emily Thwaites; 23 Algæ and 7 Ferns from Falkland Islands, by Rupert Vallentin; 153 microscope preparations of Diatoms from St. Vincent, West Indies, by Edmund Grove; a collection of Phytoplankton from the Atlantic, by Capt. W. H. Milner; 22 Marine Algæ from Swatow, China, by E. B. Howell; 5 cryptogams from Transkii, by Miss Alice Pegler; 6 Freshwater Algæ from the United States of Columbia, by Miss Sophie Fonnegra; Diatomaceous Earth from Ballarat, by W. S. Dun; a collection of Phytoplankton from the North Atlantic and Arctic Oceans, by W. L. Brown; a collection of Phytoplankton from the Red Sea, Indian Ocean, North Pacific, &c., by Capt. G. K. Wright, R.N.R.; 154 cryptogams from Samoa, by Mrs. Spicer; 31 cryptogams from Mount Kenya, by H. J. Mackinder; the moss herbarium of the late Charles

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[* This plant, described by Mr. Holmes in *Pharm. Journ.* lxii. 53, was subsequently identified (*l. c.* 205) with *Amyris balsamifera*.—Ed. Journ. Bot.]

Lyell, Esq., of Kinnordy, containing 1120 specimens, presented by Sir Leonard Lyell, Bart.

The following additions have been made by presentation to the British Herbarium: 24 phanerogams and 1 *Chara*, by G. C. Druce; 3 phanerogams, by J. Cosmo Melvill; 21 specimens of British seeds, by Clement Reid; 6 phanerogams, by C. E. Salmon; 7 phanerogams, by Arthur Bennett; 247 phanerogams, by the Rev. E. S. Marshall; 5 specimens, by C. W. Andrews; 10 phanerogams from Norfolk, from James Saunders; 2 phanerogams from F. Hilton; 3 phanerogams from W. Whitwell; 2 phanerogams from D. A. Jones; 8 *Characeæ*, by the Rev. G. R. Bullock-Webster; 2 rare Hepatics, by S. M. Macvicar; *Pimina*, a new genus of Fungi, by Greenwood Pim; a rare Alga, by Dr. Otto Nordstedt; 2 Algæ, by Lady Edith Percy; 32 Fungi, by Dr. C. B. Plowright; 10 Micro-Fungi from Ayrshire, by D. A. Boyd.

The following additions have been made by exchange of duplicates:—72 phanerogams from various localities, from Arthur Bennett; 200 phanerogams from South Africa, from Prof. Macowan; 161 phanerogams from India, from Dr. Prain; 600 European phanerogams, from E. C. Horrell; 120 Himalayan Mosses, from Miss May Roberts; 109 Lichens of the Hassler Expedition and 106 of the U.S. Exploring Expedition, from Prof. W. G. Farlow; spirit specimens of New Zealand Marine Algæ, from R. M. Laing; 400 cryptogams, from the K. K. Naturhist. Hofmuseum, Vienna.

The following specimens have been acquired by purchase:—68 phanerogams from Bulgaria, by V. S. Stríbrny; 160 phanerogams from Mexico, by C. G. Pringle; 300 European plants (Herb. Normale), by Schultz; 94 European Carices, by Kneucker; 575 phanerogams and 73 cryptogams from South-West Colorado, by Baker, Earle, and Tracey; 238 phanerogams and 102 cryptogams from the Cameroons, by Zenker; 10 phanerogams from California, by R. A. Plaskett; 392 phanerogams and cryptogams from *Sequoia* Region, California, by Geo. Hansen; 423 phanerogams from Mexico, by Dr. E. Palmer; 338 specimens, including 4 Ferns, from Sarawak, Borneo, by Edward Bartlett; 142 phanerogams from Cappadocia, by W. Siehe; 620 phanerogams and 224 cryptogams from China, by Father Hugh; 526 phanerogams and 14 cryptogams from South Africa, by R. Schlechter; 219 phanerogams from Cascade Mountains, by O. D. Allen; 51 phanerogams and 2 Ferns from Liberia, by Dinklage; 250 plants from Costa Rica, by A. Tonduz; 1600 phanerogams and cryptogams (Flora exsiccata Austro-Hungarica); 1488 specimens, including 249 cryptogams, from Porto Rico, by Sintenis; 55 *Uredineæ* and Icones, by Arthur and Holway; 400 Fungi, by Rehm; 100 Russian Fungi, by Jaczewski, Komarov, and Tranzschel; 50 Mosses from the Indian Archipelago, by Fleischer; 250 Micro-fungi, by Vestergren; 125 North American Algæ, by Collins, Holden, and Setchell; 30 North American Lichens, by Cummings, Williams, and Seymour; 445 Brazilian cryptogams, by Ule; 72 Mosses and Fungi from Newfoundland and Labrador, by Rev. A. C. Waghorne; 50 Kansas Fungi, by Kellerman and Swingle; 100 Fungi Columbiani, by Ellis and

Everhart; 250 Fungi, by Sydow; 50 North American Mosses, by Renauld and Cardot; 60 Swiss Fungi, by Winter; 50 Belgian Mosses, by Piré; 60 Austrian Mosses, by Garovaglio; 125 Lichens, by Reichenbach and Schubert; 500 Hungarian Fungi, with 89 illustrations, by Linhart; 60 Hepatics of the Ardennes, by Delogne and Gravet; 200 Fungi, by Krieger; 315 water-colour drawings of cryptogams and other plants, by Highley; 15 sheets of water-colour drawings of Fungi, by W. G. Smith; 7703 slides of Marine Algæ, mostly *Florideæ*, made by the late Prof. Schmitz, of Greifswald.

The following additions have been made by purchase to the British Herbarium:—25 British Hieracia, from Rev. W. R. Linton; 504 slides of Fresh-water Algæ, by West; 200 Micro-Fungi Britannici, by Vize; the herbarium of British Mosses (3121 specimens) of the Rev. H. G. Jameson.

SHORT NOTES.

Hypochæris glabra in Co. Derry.—At p. 497 of the second edition of the *Cybele Hibernica*, *Hypochæris glabra* L. is placed in the appendix, where it is given amongst the "excluded species," and Mackay's early records of it, which were not repeated in his *Flora Hibernica*, are described for this reason as "no doubt errors," while the only other record of this plant is extinguished with a "perhaps." It is interesting therefore to be able to record the finding of a quantity of this plant in July, 1900, growing on the extensive wild sandy Magilligan Flats in the north of the County of Derry. The plants were all small, dwarfed perhaps by the sandy soil in which they were growing, and not by any means conspicuous. The station is a level space about a rood in extent, where *Thymus Serpyllum* wove a purple carpet, varied with white flowering patches, which was a sight to see. There are indications that at some time or other the patch of ground had been cultivated, as there were slight indications of ridges through it like those left after a crop of potatoes grown in what the Ulsterman calls "rigs," and are elsewhere designated "lazy-beds"; but it is a long time since it bore a crop, as evidenced by the plants now occupying it, and it is now far from any land under tillage. The *Hypochæris* was also found on the rough ground beyond the limits of the thymy patch. There can be no question from the nature of the locality of its being native.—H. W. Lett and C. H. Waddell.

Carmarthenshire Plants.—During a walk of half a day over part of Pembrey Burrows on August 28th, 1899, we met with the following species; those which appear to be "new records" for the 44th Watsonian vice-county are starred:—*Viola Curtisii* Forster. Sand-hills, abundant.—**Hypericum quadratum* Stokes. Grows in the damper parts. — *Rubus anglosaxonicus* Gelert var. **setulosus* Rogers. In several hedges between the Burrows and the village.—**Euphrasia curta* Fr. var. *glabrescens* Wettst. Sand-hills about

Burry Port.—**Chenopodium ficifolium* Sm. Alluvial field about a mile west of Pembrey; locally abundant, with *C. album* var. *viridescens* and a little *C. rubrum*: var. *pseudobotryoides* H. C. Wats. of the last-named occurs on the Burrows.—*Spiranthes autumnalis* Rich. Not uncommon in sandy hollows (a curious place for it).—In damper ground *Epipactis palustris* Crantz. is locally plentiful, together with a great quantity of **Juncus obtusiflorus* Ehrh.; *J. acutus* L. being quite scarce.—**Asparagus officinalis* L. At one spot, about a mile west of Burry Port; apparently native. The most conspicuous vegetation on these extensive stretches of blown sand is *Œnothera biennis* L., which is here naturalized in great profusion.—Edward S. Marshall and W. A. Shoolbred.

Hypnum rugosum and Catoscopium nigritum in Ireland.—While on a botanical ramble in July, 1900, we spent two days in the neighbourhood of Benevenagh in the north of the County of Derry. Amongst the sandy Magilligan Flats at the entrance of Lough Foyle, we found *Hypnum rugosum* Ehrh. and *Catoscopium nigritum* (Hedw.) in some quantity. The former grew in luxuriant masses amongst dwarf heather and grass on the tops of the slight elevations, and the latter—which was in nice fruit—amongst the herbage in the damp hollows of the sandy soil.—H. W. Lett and C. H. Waddell.

Durham Introductions. — I am sending specimens of *Lathyrus tuberosus*, *Coronilla varia*, and *Euphorbia Esula*, all of which I found in July growing together by the railway near Bradbury Station (near Darlington). The railway officials say the two former have been there for at least ten years, and their luxuriant growth supports this statement.—Edward Potts.

NOTICES OF BOOKS.

Agricultural Botany, Theoretical and Practical. By John Percival, M.A., F.L.S., Professor of Botany at the South-Eastern College, Wye. London: Duckworth & Co. 8vo, pp. xii, 798, 265 figs. Price 7s. 6d. net.

This text-book has been written for the benefit of students of agriculture, and for all those interested practically in the culture of plants. There has been no book, hitherto, specially adapted to the needs of such students, to whom the practical aspect of botanical study is all-important. Mr. Percival has exactly met their case, and has produced a most interesting, instructive, and remarkably cheap volume, the contents of which, he tells us, are based on many years' experience of agricultural teaching.

The book is divided into seven parts, of which the first two deal with the external and internal morphology of plants. A long section (part iii.) is devoted to plant-physiology, the author always emphasizing the practical side—as for instance, when discussing

the chemical constituents of plants, he gives the relative weights of water and dry matter of the various farm crops; and again, under the heading of reproduction, he adds careful and full instructions as to the best methods of budding and grafting. The final chapter in this division deals with bud-varieties and sports, with some account of how varieties are produced.

The second half of the book is concerned almost entirely with farm plants; there is a short chapter on classification, followed by a detailed study of special plants, such as hop, mangel, turnip, grasses, clovers, &c. It is always important to bear in mind, when deciding on the value of grasses and clovers for pasture, that the plants that sheep and cattle freely eat should be employed, while those only that are invariably rejected by stock should be excluded. What an old writer called the "bateableness" of particular grasses is their highest recommendation. Tried by this standard, Mr. Percival's condemnation of zig-zag clover, *Trifolium medium*, is hardly justified, as stock eat it readily. It is the same with yarrow, the use of which "he would restrict to the narrowest limits"; in ordinary conditions it is always eaten down by stock, never being allowed to flower. The careful description of seeds must prove of great assistance to students, but he hardly emphasizes enough the angular end of the rhachilla in perennial rye-grass seed, by which it is chiefly distinguished from meadow fescue. His description of the seed of *Poa trivialis* only applies after it has been well dressed; in its natural state it is tufted with hairs at the base, and the seeds become matted together, more so than the seeds of *P. pratensis*.

The last short section (part vii.) deals with Fungi and Bacteria, both treated from an economic point of view, the former more especially with reference to plant diseases. Mr. Percival describes several of the more frequently met with fungal parasites, and gives the methods adopted for their extirpation. Is it by an error on the part of printer or author that *Peronospora* and the neighbouring genera are said to produce their sexual organs externally? They are always formed in the tissue of the host plant. Mr. Percival should know that fertilization among the Ascomycetes is no longer a matter of conjecture.

The many apt practical examples that follow each discussion form a special and admirable feature of the book; they enable the student to verify practically the statements in the text, and illuminate the subject in an admirable manner. The illustrations are numerous, and have the great virtue of being all new; but, though printers and publishers have done their work well, justice has hardly been done to Mr. Percival's drawings; some of the reproductions are blurred and weak. A good index is provided, but we should also have liked a bibliography, without which such a work is hardly complete.

A. L. S.

Flora of Bournemouth, including the Isle of Purbeck; being an Account of the Flowering Plants, Ferns, &c., of the country within a twelve-mile radius of the centre of Bournemouth. By Edward F. Linton, M.A., Oxon. With map. Sold by H. G. Commin, Bournemouth. 8vo, cloth, pp. viii, 290. Price 8s. 6d. net. [No date.]

That anything to which Mr. E. F. Linton puts his hand will be carefully and conscientiously done needs no demonstration; and it is evident, even to one unacquainted with the district, that his *Flora of Bournemouth* is accurate and exhaustive.

Whether the book was needed by botanists, other than those who choose Bournemouth as a holiday resort, seems to us doubtful; for the two counties, parts of which are embraced within its radius, have been sufficiently dealt with by Mr. Townsend and Mr. Mansel Pleydell at no remote date; and although numerous additions to their enumeration are to be found in Mr. Linton's pages, the general constitution of the respective floras is not materially affected. But for the local worker the book will be invaluable; our fear is lest its completeness should lead to the extermination of the rarer species. For example, two localities are given for *Limosella*, followed by this note: "In the Hants Flora only one locality is given, *viz.*, just N. of Brockenhurst, near the bridge. In recent years botanists have failed to find *Limosella* here. Let its fate warn collectors to be careful of these two fresh localities." Will such a warning have its due effect? We know that in the herbarium of one well-known botanist some of our rarest plants are represented by dozens, if not by hundreds, of examples; and the collecting instinct is sometimes too strong to be kept in check.

The district of the Flora is divided into five districts, which have already been defined on page 152 of this Journal. The nomenclature followed is that of the ninth edition of the *London Catalogue*, which it is to be feared must yet suffer considerable alteration before finality is attained. The introduction of aliens, casuals, and naturalized species on exactly the same footing with what may be considered the aboriginal constituents of the flora, seems to us an undesirable innovation; thus on p. 72, *Lotus siliquosus* L., of which "a large patch" occurred in a field, stands between *L. uliginosus* and *L. hispidus*, in the same type, and similarly numbered. (The mention of type reminds us to protest against the singularly objectionable capital V which is employed throughout the book, and which by appendages at its foot is made to resemble a Y; similar appendages disfigure the top of the capital A. Fancy type is objectionable under any circumstances; but its employment in a scientific book ought not to be tolerated for an instant.) In the same way, plants appear duly numbered which are almost certainly errors; e.g. *Viola stagnina* (p. 45) and *Arum italicum* (p. 221). We think it is well to include all plants in one series; but those whose claims to insertion are doubtful should be enclosed in brackets and not numbered. One plant may be added to the Flora as having at any rate at one time occurred on Brownsea Island in Poole Harbour; this is *Mathiola sinuata*, to which reference was made on p. 169 of

this year's Journal, and which, with *Diotis* and *Salsola*, were found on the island by the Marquis of Blandford in 1798 (see *Correspondence of Sir J. E. Smith*, ii. 435).

Mr. Linton's book naturally suggests comparison with the *Flora of Plymouth*, a work devoted to a district of the same extent, but we do not find in it the numerous and interesting notes on the life-history of the species, which raised Mr. Briggs's work to a level above that of a mere local flora. The most important addition to our knowledge is the description of a new subspecies of *Orchis maculata*, which we transcribe for the benefit of those who may not possess Mr. Linton's book:

"O. ERICETORUM.—More slender than the type; stem usually somewhat purplish above; leaves narrower, more or less recurved, even the lower cauline more or less acuminate, carinate and folded; spike 1 to 2 in., broadly pyramidal, at length oblong; bracts purplish; flowers pale, scentless, with rose-purple markings, ground commonly white or tinged with pink, but sometimes of deeper colour; outer line of markings nearly or quite complete; nectary slender, slightly enlarged or not at all upwards, throat narrow; lower lip sub-orbicular, rounded in outline, rather spreading; mid-lobe much smaller than the broad obliquely truncate or crenate lateral lobes, not exceeding them in length and usually shorter or somewhat recurved.

"Compared with this subspecies, or rather species, if a sufficient number of these distinctions are found on further examination to hold good, the type is rather a stouter and commonly bigger plant, with broader, straighter leaves, less carinate and folded, frequently flat, spike $1\frac{1}{2}$–$2\frac{1}{2}$ in., ovate-oblong in flowering, oblong at length, bracts more usually (? always) green; flowers with dark rose-purple markings (the outer line *pl. m.* disjointed) on a pale rose-purple ground; faintly aromatic (? always); nectary stouter, enlarged upwards, throat gaping obviously; lip deeply 3 cleft, vertically pendent; lobes sub-equal, lateral obliquely oblong crenulate; mid-lobe deltoid-oblong or deltoid-acuminate, distinctly exceeding and not much if at all narrower than the lateral, usually straight.

"These two plants have a wide distribution in Britain; sub-sp. *ericetorum* has been noted from Caithness and Sunderland to the S. Coast and Guernsey; also from Co. Wicklow. A supposed hybrid between the two occurred in Glen Lochay, Perthshire, but they seldom are found in the same locality."

Genera Siphonogamarum ad Systema Englerianum conscripta ab autoribus Dr. C. G. DE DALLA TORRE et Dr. H. HARMS. Fasciculus primus. 4to, pp. 80. Lipsiæ sumptibus G. Engelmann. 1900. Price 4 marks.

WE should be in a better position to describe the scope of this work had the authors favoured us with a preface. We conclude, however, that the "Systema Englerianum" is that of the great *Pflanzenfamilien* of Engler and Prantl, and that the limits of genera here adopted are those accepted by the authors of the various monographs of which that work is made up. It would appear also that

the nomenclature adopted is based on the rules formulated by Prof. Engler and some of the Berlin botanists, which were translated and commented on in this Journal for 1897, pp. 305–7, and which include the "fifty years' limit," numerous objections to which have been made, some of them formulated in this Journal for 1898, pp. 90–94.

We do not think this limit is likely to be generally received or deserving of such acceptance, but, with this important reservation, we have nothing but praise for the full bibliography which the authors have given us in this first instalment of their work. It will not, indeed, supersede Pfeiffer's excellent *Nomenclator Botanicus*, which is on somewhat different lines; but as a compendious history of genera it has no equal, and must find a place in every reference library.

The present work, however, is more than a mere synonymic list of genera. The orders are divided into groups of diverse rank, and although no diagnoses are given, a full bibliography is appended to each; to each genus, in addition to this, is appended an estimate of the number of species it includes, and a brief summary of its geographical distribution. From this it will be seen that the *Genera* when completed will be invaluable as a work of reference, and will afford another example of that careful industry which, until the advent of Mr. B. D. Jackson, we were accustomed to think was not met with out of Germany.

The work is clearly printed in double columns, the type being well chosen and well selected. Only one detail seems to us undesirable—the insertion of a colon after the word "in" in quotations such as the following: "*Nannorhops* H. Wendl. in: Bot. Zeitg. xxxvii. (1879) 147." The fact that the date is in every case assigned to the publication adds materially to the usefulness of the work.

Lehrbuch der Botanik für Hochschulen. Von Drs. E. Strasburger, F. Noll, H. Schenck, & A. F. W. Schimper. Vierte verbesserte Auflage. 8vo, pp. viii, 588; figs. 667 (part coloured). Jena: Fischer. 1900. Price 7 M. 50 Pf. (paper); 8 M. 50 Pf. (bound).

The appearance of a fourth edition only about five years after the issue of the original must be a gratifying proof both to authors and publisher of the success of this admirable German text-book. That such success is well merited may be gathered from previous reviews in this Journal (1895, p. 57; 1898, p. 325), to which we can add little. The book has grown from 570 pages in the third edition, an increase of eighteen, which is accounted for by the considerable addition to the number of figures—667 as against 617. Many of the additions consist of coloured figures of poisonous or officinal plants in the section dealing with the classification of seed-plants; in fact, this last part of the book is becoming quite a blaze of colour, and gives additional attraction to the study of systematic botany.

We would again suggest the advisability of revising parts of the section dealing with physiology, especially as regards the process of

carbon-assimilation, the chemistry of which is seriously out of date. Also, considering that a bound copy costs less than 8s. 6d., the paper-covered edition might be suppressed. The book is well worth the extra shilling charged for binding.

A. B. R.

Exchange Club Reports.

The Botanical Exchange Club of the British Isles. Report of the Distributor [James Groves, F.L.S.] for 1898. (Issued 18th May, 1900.)

The Sixteenth Annual Report of the Watson Botanical Exchange Club, 1899–1900. E. S. & C. E. Salmon, Distributors.

These reports of two Societies which occupy almost the same ground contain, as usual, much that is of interest to the British botanist, as well as much that can only be of value to the contributor whose specimens are commented upon. In the report of the older Society the usual divergences of opinion among critical botanists are recorded, and there are pages of notes on *Rubus*—*Rosa* is having a quiet time of it just now—*Salix*, *Hieracium*, and other critical genera.

We observe that questions of nomenclature are finding their way into the Exchange Club Reports. The Messrs. Groves, we are sorry to see, endorse the principle "once a synonym always a synonym"; and Prof. E. Hackel maintains that the employment of a name for a species invalidates its use for a variety of another species in the same genus: we cannot accept either of these positions. Some of the citations given are scarcely accurate: *e.g.* Mr. Druce writes "*Salvia pratensis*, var. *α.*, Linn. Sp. Pl. 25." Linnæus had a var. *β* of his *pratensis*, but no "var. *α*"; and to credit him with one is to make him say what he did not say, and to introduce a new and inaccurate form of reference. The same writer's citation of "*Bromus interruptus* Druce in Pharm. Journ. Suppl. Oct. 5 (1895) and Linn. Soc. Journ. (1896) [xxxii] 426–30" is also open to objection. The supplements to the *Pharmaceutical Journal* are of so little importance that their contents are not even entered in the indexes to the volumes; and even if a name printed there could be considered as a publication, it could hardly hold in this case, as there is no word of diagnosis or description of the plant. The plant was published as a species, with a brief diagnosis, in this Journal for November, 1895, p. 345—a reference omitted by Mr. Druce both here and in his account of the plant in the Linnean Society's Journal.

We extract the following notes of special interest for the benefit of those of our readers who do not belong to either Society.

"*Cerastium arcticum* Lange, var. *Edmondstonii* Beeby. Serpentine gravels, Unst, Shetland, 31st August, 1897, and 31st July, 1898.—W. H. Beeby. When I first gathered this plant in 1886, I brought home roots, and, being very desirous of growing it, also a bag of its native soil. Under these conditions it maintained the dark purplish copper colour of its foliage fairly well, until the plants were lost in a removal some few years later. In 1897 and 1898 I brought home seeds and roots, and have the plants growing this time not in

their native soil, but in a mixture of Surrey soils. These plants have entirely lost their original colour, and have become completely green ; so that it appears that the only character which separates this variety from the type is merely temporary and due to habitat. The serpentine gravels of Unst contain a number of minerals, notably chromate of iron, and the colour of the leaves may probably be due to the influence of one of them. The *Cerastium* is by no means the only plant growing on these hills which is affected in this way. J. M. Norman's '*C. latifolium*' is, of course, *C. arcticum* (*C. latifolium* proper not being known in Scandinavia or other boreal countries), consequently his reference of *C. arcticum* to a hybrid *C. alpinum* × *C. latifolium* is mythical.—W. H. B."

"*Saxifraga Andrewsii* Harvey. Hort. Prestwich, July and August, 1898.—J. C. Melvill. This, reported to have been originally found on a mountain to the south of Glen Caragh, Co. Kerry, by the late Mr. Andrews, has never been rediscovered in a wild state. I received many years ago a specimen labelled as having been a descendant of the original Kerry plant, and have grown it since 1875. It increases rapidly by throwing out fresh rosettes annually, but, though it apparently ripens its seed, I have yet to prove that it is fertile. It is supposed by some authors to be a hybrid between *S. umbrosa* L. and *S. Aizoon* L. The latter, however, does not grow wild in this country. It is the *S. Guthrieana* Engler (Verh.-Zool. Bot. Ges. Wien. 1869, 537).—J. C. M."

"*Orobanche amethystea* Thuill. ? On leguminous plants near Dursley, W. Gloucestershire, 13th July, 1898.—J. W. White. In some measure these specimens resemble *O. amethystea* rather than *O. minor*, but I am unable to name them positively. Does *amethystea* ever grow inland upon *Trifolia* ?.—J. W. W. I believe Mr. White sent me this, or a similar plant, in a fresh state, and that I led him to think it might be *amethystea*, but looking at the general habit, curvature of the corolla, stigma, &c., I believe it to be only a form of *O. minor* Sutt. (*eu-minor* Syme). *O. amethystea*, when compared in a fresh state with *O. Picridis* and *O. minor*, looks very different ; the pale bluish purple with which it is suffused is very pretty, and contrasts greatly with the whitish yellow of *O. Picridis*. When growing on *Ononis* and on *Daucus*, side by side, *O. amethystea* does not look practically different ; but in one place near St. Margaret's, Kent, I find a very small-flowered form on *Daucus* (*O. Carotæ* Desm. ?). It has been said that the differences in *Orobanche* may be produced by the host plants, but I have failed to see any difference in *eu-minor* on *Trifolium*, and on *Crepis virens*, plants of very different natural orders ; and I have traced on the same day *O. caryophyllacea* on *Galium verum*, *G. elatum*, and *Lotus corniculatus*, contrasted them, and found no appreciable difference.—Arthur Bennett."

"*Stachys alpina* L. Open woodland and hedge-banks between North Nibley and Wotton-under-Edge, W. Gloucestershire, 8th July, 1898.—J. W. White. Discovered by Mr. Cedric Bucknall (see Journ. Bot. xxxv. 380). This summer a special search, undertaken by three of us, has extended the known area of the plant to about two square miles, and has shown that it occurs in great

abundance in many spots, preferring, apparently, the sunniest and most sheltered positions, although at a considerable altitude. The idea that it may have been introduced in the locality is, to our minds, quite untenable. An examination of the district readily leads one to understand how it is that this species has remained so long unobserved. The coppices being cut only at intervals of from fifteen to twenty years, it would be a matter of rare chance if they were explored by botanists at a time when an unobtrusive plant could attract notice. Ploughed land extends to the wood borders, where there are no paths; and, oddly enough, if the *Stachys* grows near a road or track it is nearly always on the far side of a hedge.—J. W. W."

The Report of the Watson Club contains less that is of general interest, although the notes on plants sent in are no doubt useful to the members. Mr. Alfred Fryer makes the following remarks on a form of *Potamogeton*:—

"*P. crispus* Linn. var. *serratus* Huds. *Vide* Rev. W. R. Linton. Canal, Renishaw, Derbyshire, v.c. 97. July, 1899.—C. Waterfall. These specimens differ from the state of *P. crispus* generally accepted by British botanists as Hudson's *P. serratus* by the indistinct, practically obsolete serration of the margins of the leaves, in the axillary branchlets having the lower leaves directly sessile on the stem, not mounted on sheath-like stipules, and in the presence of minute glands on the stem at the base of many of the leaves. The habit of the plant is rather that of *P. Friesii*, or of young states of *P. obtusifolius*, than of *P. crispus*; the flower-spike, too, indicates some kinship to *P. Friesii*. The Rev. W. R. Linton, who discovered the plant, tells me that it grew with *P. crispus* and *P. Friesii*, and he now thinks that it is a hybrid between the two. This is the view I took when I first saw the specimens, and I am disposed to believe that *Friesii* is the second parent. When growing Mr. Linton supposed it to be *P. obtusifolius*, misled, no doubt, by the foliage of a darker green than that of *P. Friesii*. In accordance with the plan I have followed in the case of hybrid Potamogetons, I propose for this plant the name of its discoverer, who has permitted me to describe it, and who has supplied details of the habit of the living plant which leave little doubt of the correctness of the conclusion we independently arrived at as to its hybrid origin. Those who object to accept the name of × *Potamogeton Lintoni* may label their specimens *P. Friesii* × *P. crispus*; in which case, however, it is to be hoped they will be consistent enough to discard such names as *P. fluitans*, *P. nitens*, and *P. decipiens*. *P. Lintoni* is very distinct from the closely allied hybrid *P. Bennettii* (= *P. crispus* × *P. obtusifolius*)."

While admiring the energy and labour which is bestowed upon the conduct of these two Clubs, we cannot help regretting, in the interests of those who carry them on, that they are not united. No doubt there are reasons for keeping them distinct; but seeing how much there is to do, and how little time there is to do it in, it is impossible not to feel that labour might be economized by such a combination.

*ARTICLES IN JOURNALS.**

Bot. Centralblatt (Nos. 30–34).—O. Lörinson, 'Ueber Keimungs- und Wachsthumsversuchte an Erbsen' (concl.). — (No. 30). P. Kosaroff, 'Die Wirkung der Kohlensäure auf den Wassertransport in den Pflanzen.' — (No. 32). E. Küster, 'Bemerkungen über die Anatomie der Eichen.' — (Nos. 33–35). F. Brand, 'Der Formenkreis von *Glœocapsa alpina*.'—(No. 35). A. C. Hof, 'Über die Topik der Alkalivertheilung in pflanzlichen Geweben.' — R. v. Fischer-Benzon, 'Zur Geschichte des Kürbis' (1 pl.).

Bot. Gazette (19 July).—D. S. Johnson, 'Endosperm and embryo of *Peperonia*' (1 pl.). — J. Cardot & I. Theriot, 'Mosses of North America' (4 pl.). — K. M. Wiegand, 'Development of the embryo-sac' (2 pl.). — A. B. Cordley, 'Apple-tree anthracnose.' — B. L. Robinson, '*Caryophyllaceæ* & *Cruciferæ* of Sierra Madre.'—(15 Aug.). H. G. Timberlake, 'Development and function of cell-plate in higher plants' (2 pl.).—G. T. Moore, '*Chlorocystis Cohnii*' (1 pl.).—L. Murbach, 'Seed-burying awns of *Stipa avenacea*.' — E. Nelson, 'New Wyoming plants.' — J. M. Holzinger, 'New N. American Mosses' (1 pl.).

Bot. Zeitung (16 Aug.).—H. Fitting, 'Bau und Entwickelungsgeschichte der Makrosporen von *Isoetes* und *Selaginella*' (2 pl.). — F. Schütt, 'Die Erklärung des centrifugalen Dickenwachthums der Membran.'

Bull. Soc. Bot. France (xlvii. 6: 31 July).—F. Camus, '*Lejeunea Rosettiana* en France, et remarques sur les espèces françaises du genre.'—H. de Boissieu, *Staphylea Francheti*, sp. n.

Bull. Soc. Bot. Italiana ('Ap.: May': recd. 11 Aug.). — G. Arcangeli, '*Ranunculus cassubicus* e *R. polyanthemum*.'—C. Casali, 'Sulla classificazione dei generi *Boelia* e *Retama*.'

Bull. Torrey Bot. Club (25 June). — T. F. Allen, 'Three new Charas from California' (6 pl.). — F. H. Blodgett, 'Vegetative Reproduction and multiplication in *Erythronium*' (2 pl.). — R. S. Williams, 'Two new Grimmias from Montana' (2 pl.). — H. Lindberg, *Pohlia porosa*, sp. n. (1 pl.).—R. M. Harper, 'Flora of Middle Georgia' (1 pl.). — L. F. Henderson, 'New plants from the Northwest.'

Nuov. Giorn. Bot. Ital. (July: recd. 11 Aug.). — A. Preda, *Bornetia secundiflora* (1 pl.). — C. Casali & T. Ferraris, 'Materiali per la Flora Irpina.'—G. Crugnola, 'La Flora dell' Abruzzo Teramano.' — A. Fiori, 'Flora della Basilicata e Calabria.' — P. A. Saccardo & F. Cavara, 'Funghi di Vallombrosa.' — G. Bresadola & F. Cavara, 'Funghi de Terracina' (1 pl.).

Oesterr. Bot. Zeitschrift (July & Aug.). — L. Čelakovský, 'Die

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* The dates assigned to the numbers are those which appear on their covers or title-pages, but it must not always be inferred that this is the actual date of publication.

Vermehrung der Sporangien von *Ginkgo biloba*.' — R. Schlechter, '*Acriopsis* und ihre Stellung zu der *Podochilineæ*.'—(July). E. Ott, 'Zur Kenntniss der Härte vegetabilischer Zellmembranen.' — A. Degen, 'Über einige orientalische Pflanzenarten.'— J. Velenovský, 'Misbildung in dem Blüten des *Ranunculus acris*.'— E. Palla, 'Die Unterscheidungsmerkmale zwichen *Anemone trifolia* & *A. nemorosa*.' — J. Freyn, 'Nachträge zur Flora von Istrien.' — F. Vierhapper, *Arnica Doronicum* Jacq. (concl.). — (Aug.). V. Schiffner, 'Uber *Jungermania collaris*.' — R. v. Wettstein, 'Die nordamerikanischen Arten der Gattung *Gentiana* sect. Endotricha.'—F. Búbak, 'Zweiter Beitrag zur Pilzflora von Tirol.'

Rhodora (Aug.).—F. S. Collins, 'New England species of *Dictyosiphon*.' — M. L. Fernald, 'Undescribed varieties and hybrids of *Carex*.'

BOOK-NOTES, NEWS, &c.

With praiseworthy promptitude Mr. F. M. Bailey has issued a second instalment of his useful manual on *The Queensland Flora*, the first part of which was noticed on pp. 143–145 of this Journal. The main lines of the work were sufficiently indicated on that occasion, and the present part is of course on the same lines. One could wish that the figures, which are usually of little-known species, were more satisfactory; they sometimes give the impression of having been drawn from insufficient material. The translations of the Latin trivials are not always accurate; *e.g.* the equivalent of *flexilis* is not "flexuose" (p. 359), nor does *grandis* mean "a grand species" (p. 660).

We are glad to learn that Messrs. F. H. Knowlton and F. V. Coville have for some years been engaged in collecting material for a Biographical Index of American Botanists. It is to be feared, however, that a considerable period must elapse before it will be ready for publication.

We have received the first part (issued February 25th) of *Icones Floræ Japonicæ*, compiled by the College of Science, Imperial University, Tokyo. The plates, which are in large folio and will form an extremely handsome volume, are beautifully executed by T. Makino, and contain a profusion of detail; those in this instalment represent *Prunus Pseudocerasus* α *spontanea* (two plates), and *Isopyrum nipponicum*. The descriptions are in Japanese. The work may be obtained of Maruya & Co., Tokyo.

Part iv. of the Welwitsch Catalogue has just appeared; it contains the remaining portion of the Dicotyledons and concludes the volume, which has been entirely elaborated by Mr. Hiern.

We are glad to announce the publication of the Rev. W. M. Rogers's *Handbook of British Rubi*, of which a notice by the Rev. E. F. Linton will appear in our next issue.

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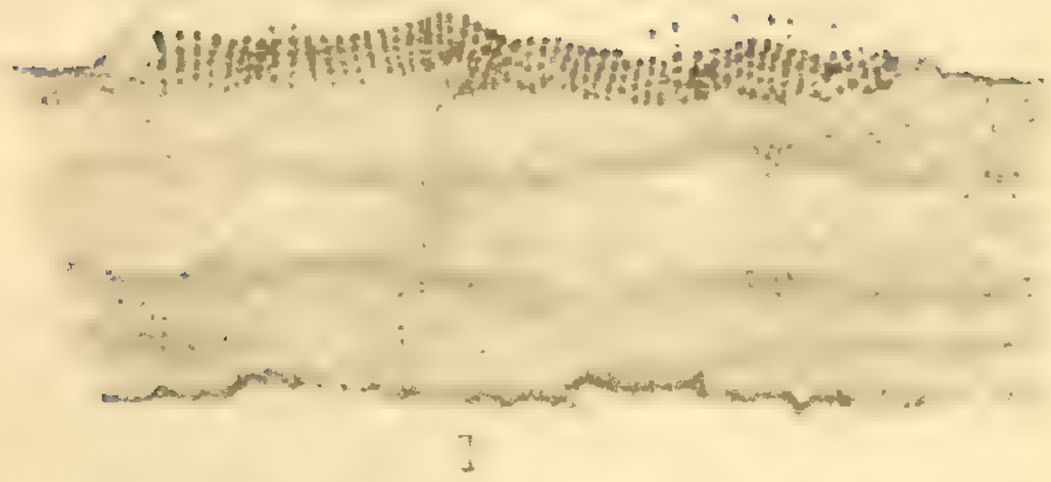

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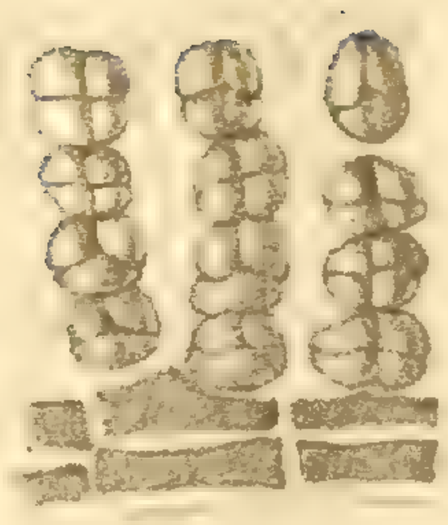

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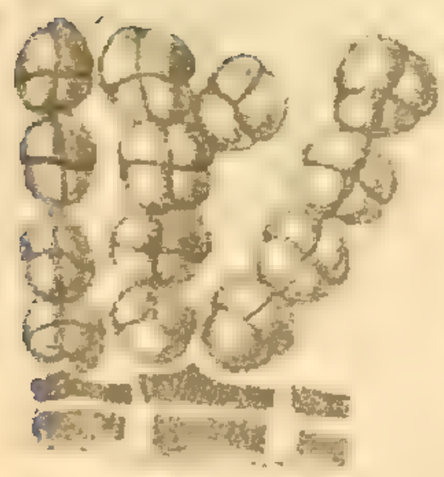

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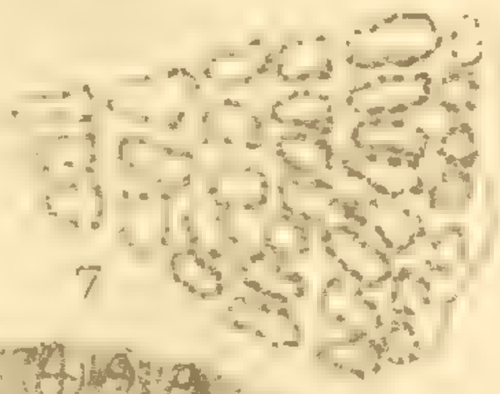

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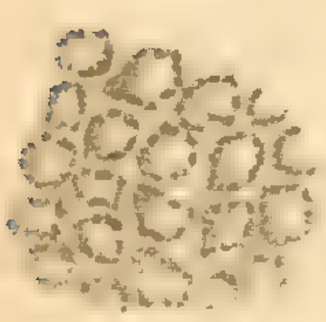

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New or critical British Marine Algæ.

NEW OR CRITICAL BRITISH MARINE ALGÆ.

By E. A. L. Batters, B.A., LL.B., F.L.S.*

(Plate 414.)

Several species, not previously noticed on the shores of the British Isles, have recently been added to our marine alga-flora. Most of them are inconspicuous plants, as was to be expected in a country whose shores have been industriously and successfully explored for the best part of a century in the search for marine algæ. In the present paper I propose to give a list, with descriptions of some undescribed forms, of the more important species that have recently come under my notice.

Myxophyceæ.

1. Oncobyrsa marina Rabenh. Flor. eur. Alg. ii. p. 68 (1865). Attached to the fronds of *Lichina pygmæa*, Swanage, Sept. 1897; *E. M. Holmes*. Outwardly this plant has somewhat the appearance of *Brachytrichia Balani*, for which it was mistaken when gathered, but in structure and every other respect differs widely from it.

2. Chamæsiphon marinus Wille in Dijmphna-Sogt. zool. bot. Udb. p. 4, tab. 13, fig. 1. On *Lyngbya lutea*, &c., Swanage, Sept. 1898; *E. A. B.* This minute species, the filaments of which scarcely reach 1 μ in diameter, is frequently found on the filaments of *Lyngbyæ*, various species of *Ulothrix*, &c., at Swanage, and, no doubt, at many other places on our coasts.

3. Plectonema norvegicum Gomont, Bulletin de la Soc. bot. de France, vol. xlvi. p. 34, Feb. 1899. Mixed with *Calothrix scopulorum* and other *Myxophyceæ* on rocks near high-water mark, Clacton, Feb. 1893, and Swanage, Aug. 1894; *E. A. B.*

4. P. Battersii Gom. *l. c.* p. 36. Mixed with *Prasiola stipitata*, &c., on rocks near high-water mark, Berwick-on-Tweed, Feb. 1887; *E. A. B.*

5. Phormidium Ectocarpi Gom. *l. c.* p. 37, pl. 1, fig. 13. *P. persicinum* Batt. (non Gom.) pro parte. This species forms a pink film over *Ectocarpi* or on the surface of the mud at high-water mark. Cumbrae, Aug. 1891; *E. A. B.* Plymouth, June, 1896; *G. Brebner*.

6. Schizothrix vaginata Gom. Monographie des Oscillariées, p. 40, pl. vii. figs. 1–4. Near the Picket Rock, Sidmouth, Aug. 1885; *E. A. B.* Cumbrae, Aug. 1899; *Mrs. Robertson*. I am indebted to Dr. Gomont for the identification of this and the three preceding species.

7. Nostoc entophytum Bornet & Flahault, Rev. des Nostocacées heterocystées in Annales d. Sc. Nat. 7e ser. Bot. vii. p. 190. To this species I refer some specimens of a microscopic *Nostoc* which I found embedded in the thallus of *Rivularia Biasolettiana* at Cumbrae

* See Journ. Bot. 1895, 274–6; 1896, 6–11, 384–390; 1897, 433–440.

in Aug. 1891. I saw no more specimens till last October, when I received from Mrs. Robertson some specimens of *R. nitida* from the same locality, and on examining them I found many specimens of this or a closely-allied species of *Nostoc*. Mrs. Robertson's plants are larger than those I found in 1891, frequently reaching 1–2 mm. in diameter, are more regularly ovate in form, and are often found growing on the surface of the *Rivularia*, and not imbedded in its thallus.

Chlorophyceæ.

8. Prasinocladus lubricus Kuckuck, Bemerk. zur mar. algen-veg. von Helgoland, i. p. 261, fig. 28, Feb. 1894. *Euglenopsis subsalsa* Davis in Ann. Bot. vol. viii. no. 32, p. 388, Dec. 1894. In the autumn of 1897 Mr. Arthur Church sent me specimens of this curious organism from the Marine Biological Association's Laboratory at Plymouth, where it had made its appearance in the glass culture-jars in which *Cutleria multifida* and other algæ from the Sound were growing. These specimens agreed well with the figures and description of *Euglenopsis subsalsa* given by Davis in the *Annals of Botany*, while the older films and those presumably grown under unfavourable conditions exactly resembled Kuckuck's figures of *Prasinocladus lubricus*. There can be little or no doubt that the two descriptions refer to one and the same organism, Kuckuck's *Prasinocladus* having the priority of publication by a few months. I do not feel equally confident, however, that the organism in question is really an alga, and not rather one of the flagellate protozoa.

9. Cladophora (Ægagropila) corynarthra Kützing, Phyc. germ. p. 210; Id., Tab. Phyc. vol. iv. t. 72, fig. 2.

Var. spinescens, n. var. Filaments densely packed together, forming a dark green, spongy, thorny layer 1–3 in. in width; branches numerous, stiff, irregularly placed—opposite, dichotomous or three or more in a whorl—branchlets, secund, bluntly pointed; cells 40–120 μ in diameter, two to five times longer than broad.

Lying loosely fixed amongst the roots of *Zostera*, on a rather muddy bottom in 3–4 fathom water. Roundstone Bay, Connemara, March, 1883, *Dr. Painter*; April, 1899, *H. H. Hanna*, Weymouth, April, 1890; *E. M. Holmes*.

This variety differs from the type in the shorter cells, bluntly pointed branchlets, more irregular branching, and somewhat more robust filaments.

10. C. corymbifera Kützing, Spec. Alg. p. 397; Id., Tab. Phyc. iv. tab. 8. In pools near low-water mark, Berwick, Oct. 1882; *E. A. B.* Perhaps only a form of *C. hamosa* Kütz., as Hauck believed it to be, but in any case a very pretty plant.

11. C. Neesiorum Kütz. Spec. Alg. p. 396; Id., Tab. Phyc. iv. tab. 5. Var. *humilis* = *C. humilis* Kützing, Spec. Alg. p. 396; Id., Tab. Phyc. iv. tab. 4. In shallow, sandy-bottomed, sunny pools between tide-marks, Berwick, Aug. 1884, &c. Swanage, Aug. 1894; *E. A. B.* This species is closely related to *C. rupestris*, for dwarf specimens of which it might be mistaken, if not closely

examined. The tufts are usually dark green below, and yellowish or brown above. It appears to be a not uncommon species on our shores, and I have seen numerous British specimens, gathered by Mr. E. M. Holmes, but I have no note as to the exact locality or date of gathering.

12. C. (Spongomorpha) Sonderi Kütz. Phyc. germ. p. 208; Id., Tab. Phyc. iv. tab. 79. Orkney; *J. H. Pollexfen*. In the herbarium of the late Dr. Pollexfen there are a couple of specimens of this species marked *C. arcta*. The filaments, which are very much more robust than in any other British species belonging to the subgenus *Spongomorpha*, are free, except at the base, where they are matted together by numerous rhizoids. The tufts have much the appearance of the var. *Vaucheriæformis* of *C. centralis*. The cells often reach 200 μ and more in diameter. The specimens were probably gathered about 1840, but are not dated; the locality being given as "Orkney," without further indication.

13. C. pallida = Acrosiphonia pallida Kjellman, Chlorophycéslägtet Acrosiphonia, p. 88, tab. vii. figs. 11–21. On the leaves of *Zostera*, Bognor, May, 1885; *E. A. B.* Cumbrae, May, 1899; *Mrs. Robertson*. The widely spreading, compact, almost membranous, basal layer from which the erect filaments arise render the recognition of this species easy.

14. C. stolonifera = Acrosiphonia stolonifera Kjellman, *l. c.* p. 85, tab. vi. Berwick, Oct. 1882. Cumbrae, Aug. 1891; *E. A. B.*

Phæophyceæ.

15. Myrionema polycladum Sauvageau in Ann. des Sciences naturelles, Bot. 8e ser. tome v. 1898, p. 73, fig. 13. On the blade of *Saccorhiza bulbosa*, Swanage, Sept. 1898; *E. A. B.*

16. M. Corunnæ Sauvageau, *l. c.* p. 77, fig. 14. On the blade of *Laminaria saccharina*, Cumbrae, Aug. 1891, and Swanage, Sept. 1898; *E. A. B.*

17. M. papillosum Sauvageau, *l. c.* p. 82, figs. 15–17. On the blade of *L. saccharina* and *L. digitata*, Weymouth, Sept. 1892, and Swanage, Sept. 1898, *E. A. B.*

18. Myrionema ? saxicola Kuckuck, Bemerk. mar. algenvegetat von Helgoland, ii. p. 381, fig. 8. On rocks near high-water mark, and on limpet shells, in company with *Isactis plana*, Swanage, Sept. 1898; *E. A. B.*

19. Hecatonema maculans Sauv. *l. c.* p. 88, figs. 18–22. On *Corallina officinalis*. Peveril Point, Swanage, Sept. 1888. On *Rhodymenia palmata* and *L. saccharina*, Swanage, Sept. 1897; *E. A. B.*

20. Chilionema Nathaliæ Sauv. *l. c.* p. 103, figs. 23–24. On *Rhodymenia palmata*, Swanage, Sept. 1898, *E. A. B.* This species is frequently found growing in company with *Chilionema ocellatum* Sauv. (= *Ascocyclus ocellatus* Reinke), to which it appears to be united by many intermediate forms. Many, if not all, of the specimens referred by Mrs. Griffiths and Harvey to *Myrionema*

Lechlancherii, which I have seen, really belong to this species; and it appears to me that this, and not the form of *M. strangulans* (= *M. vulgare* Thur.) with plurilocular sporangia, as supposed by Prof. Sauvageau, is the plant which Harvey called *M. Lechlancherii*. It is quite probable, however, that Harvey referred plants belonging to more than one species to his *M. Lechlancherii*. Chauvin's *Rivularia Lechlancherii* is, no doubt, *Myrionema strangulans* Greville = *M. vulgare* Thuret.

21. C. REPTANS Sauv. *l. c.* p. 108, fig. 25. *Ectocarpus reptans* Crouan, Florule du Finistère, p. 161, pl. 24, gen. 158, figs. 3 & 4. On *Fucus serratus*, Swanage, Sept. 1898; *E. A. B.* The *Ascocyclus reptans* of Mr. Holmes's and my Revised List is not referable to the present species, but to *Hecatonema reptans* Sauv.

22. ASCOCYCLUS HISPANICUS Sauv. *l. c.* p. 115, figs. 26–37. On *Saccorhiza bulbosa*, Swanage, Sept. 1898, *E. A. B.*

23. A. SPHÆROPHORUS Sauv. *l. c.* p. 120, figs. 28–29. On *Rhodymenia palmata*, Weymouth, Sept. 1892, and Swanage, Sept. 1898; *E. A. B.* A common and abundant species at Swanage, often covering a considerable portion of the upper part of a *Rhodymenia* frond, at first with numerous isolated individuals, but finally with an almost continuous brown layer made up of innumerable *Ascocyclus* plants growing side by side, and more or less overlapping each other.

24. ECTOCARPUS (?) HELOPHORUS Rosenvinge, Deuxième Mém. sur les Alg. mar. du Groenland, p. 82, figs. 17–18. Endophytic in the frond of various species of *Cruoria* and *Petrocelis*, Berwick, Jan. 1887; *E. A. B.* Cumbrae, Nov. 1892; *G. Brebner*.

25. ENDODICTYON INFESTANS Gran, Kristianiafjordens Algeflora, i. p. 47, tab. i. figs. 12–17. Parasitic in species of *Alcyonidium*, Southsea, Nov. 1897; *E. A. B.* The resemblance between this plant and Kuckuck's *Phæostroma Bertholdi*, as Herr Gran has himself pointed out, is very great; indeed, the parasitic habit and the fact that the branching spreads in all directions through the substance of the host, while *Phæostroma* is epiphytic and its growth dorsiventral, are almost the only marks by which the two plants can be separated.

26. PUNCTARIA CRISPATA = PHYCOLAPATHUM CRISPATUM Kütz. Phyc. germ. p. 299 (1843); Id., Tab. Phyc. vi. t. 49. *Punctaria laminarioides* Crouan, Fl. Finistère, p. 167 (1867). Fronds deep brown, 3–20 in. long and about as broad, shortly stipitate; stipe cylindrical, slender, inconspicuous, 2 or 3 lines long, suddenly expanding into an oblong, orbicular or irregularly shaped lacerate-erose frond, with strongly crisped margins. Lamina 150–200 μ thick, formed of 6–8 layers of cells. Internal cells large and colourless; superficial cells small and coloured. Substance firm and coriaceous. Unilocular sporangia scattered, immersed, formed from the superficial cells. Clusters of hairs absent (or not observed?).

On *Zostera*, Scilly Islands, June, 1899; *E. George*.

The above description applies to some very curious and interesting specimens sent to me last year by Mr. Edward George from

the Scilly Islands, where he was spending his summer holiday. Except in size, they agree well with Kützing's figures and description of *Phycolapathum crispatum*, an imperfectly known species which seems to me identical with *P. laminarioides* Crn., described twenty-four years later. This species must not be confounded with the form of *P. latifolia* which Mr. Holmes and I have called var. *laminarioides* (Holmes & Batters in *Annals of Botany*, vol. v. p. 523), specimens of which are sometimes 18 in. long and 6 in. wide, but which in all other respects agree with the ordinary form of the species. The structure of the frond, which, as Prof. J. G. Agardh has pointed out (J. Ag. Analecta Algol. Cont. iii. p. 7), is more like that of an *Asperococcus* than a *Punctaria;* the dark colour, thick substance, strongly crisped margins of the frond, the absence of clusters of hair, and the slight differentiation of the sporangia, which are with difficulty distinguished from the superficial cells, render *P. crispata* readily distinguishable from *P. latifolia*. Perhaps *P. crispata* may be regarded as the type of a subgenus for which the name *Phycolapathum* might be retained.

27. Phæosaccion Collinsii Farlow, Notes on New England Algæ, Bull. Torr. Botan. Club. vol. ix. 1882, p. 65; Rosenvinge, Groenlands Havalfer, p. 874, tab. i. fig. 5 & fig. 20 on p. 875. On the leaves of *Zostera marina*, Cumbrae, March, 1894; *Mrs. Robertson*. This very interesting species, which had previously only been recorded from North-Eastern America and Greenland, was added to our marine flora by Mrs. David Robertson in 1894. She has since found it on several occasions at Cumbrae. It makes its appearance early in spring, and by the end of April has entirely disappeared. The Cumbrae specimens agree well with the specimens distributed in Hauck & Richter's Phykotheka universalis, no. 12, and with the excellent figures given by Rosenvinge. The plant when fresh is of a yellowish brown colour, but is very apt to turn green when dried.

Rhodophyceæ.—1. Bangiaceæ.

28. **Neevea,** gen. nov. Thallus microscopic, endozoic, filamentous, procumbent, creeping in the substance of *Flustra foliacea*, composed of violet or rosy purple cells arranged in a single or two or more parallel rows within a gelatinous sheath; filaments irregularly branched, in the older parts of the thallus united into a compact pseudoparenchymatous layer one or more cells in thickness. Cells at first oval, becoming angular and very irregular in shape by mutual pressure. Reproduction effected by the escape of the cells from the gelatinous sheath, and their subsequent development into new individuals?

N. repens, sp. unica. Fronds from ·25–1·5 mm. in diameter; filaments from 12–36 μ in breadth, in some parts containing but a single row of cells, in others 2–8 rows; cells 6–15 μ long, 4–9 μ broad. Tab. 414, figs. 18–22. Endozoic in *Flustra foliacea*, Deal; *J. T. Neeve*.

In the spring of the present year Mr. John T. Neeve found on the shore at Deal some specimens of *Flustra foliacea* with hardly

perceptible pink stains on them; these he very kindly sent to me for identification. On examining the stains with the microscope I found that they were caused by the innumerable pink discs of an *Erythropeltis*. In studying this I made many sections of the *Flustra*, and it was then that I found in the interior of the Bryozoan the plant above described. The patches are of a clear violet or rosy pink colour, but can only be seen by the naked eye when the semitransparent *Flustra* is held against the light. The filaments radiate from the openings through which the tentacles of the living Bryozoan are protruded. In the central portion of the thallus they are always fused into a compact pseudoparenchymatous layer one or more cells in thickness, and it is only at the edges of the expansion that they are free. In many cases, however, the thallus is entirely composed of a membranous layer, the filamentous nature of the various branches by the union of which it is formed being very difficult to trace. The procumbent habit, parasitic mode of life, and the union of the filaments into a membranous layer distinguish this genus from *Goniotrichum*, the irregular form of the layer from *Erythropeltis*. The genus is named after Mr. J. T. Neeve, who, it may be remembered, is also the original discoverer of *Gonimophyllum Buffhami*, described in this Journal for 1892 (p. 65, t. 319).

29. Erythrotrichia ciliaris Batt. (non Thuret nec Berthold nec aliorum) = Bangia ciliaris Carm. in Hook. Br. Fl. ii. p. 316. Fronds dark purple, 500–800 μ long, 10–30 μ broad (in specimens from Arbroath 1–2 mm. long and 10–200 μ broad), several arising from a monostromatic cellular disc; discs roundish, 50–200 μ in diameter; cells roundish-polygonal, 15–24 μ in diameter. Spores about 18 μ in diameter. Appin, about 1820; *Capt. Carmichael.* Arbroath, Sept. 1890; *E. M. Holmes.* Scilly Islands, June, 1899; *E. George.*

Hitherto botanists have not been agreed as to the identity of Carmichael's *Bangia ciliaris*. Kützing thought it was a variety of *Erythrotrichia carnea* (= *Goniotrichum ceramicola* Kütz.). Thuret, on the other hand, recognized in *Porphyra Boryana* Mont. the true *B. ciliaris*, while still more recently Berthold, not unnaturally, mistook a plant I propose to call *E. Bertholdii* for Carmichael's species. Crouan, Hauck, and most other recent writers unhesitatingly follow Thuret in uniting *E. Boryana* with *B. ciliaris*, which they regard as a species of *Porphyra*. I am uncertain what the *B. ciliaris* of the Nereis Boreali-Americana really is, but the specimens from Bridgeport, Connecticut, distributed by Collins in the Phykotheka universalis no. 655, appear to me to be referable rather to *E. investiens* than to *B. ciliaris*, Nothing but an inspection of Carmichael's original specimens preserved in the Hookerian Herbarium at Kew could clear up the matter, and I am much indebted to Sir William Thiselton Dyer for permission to examine them. To the naked eye the *Bangia* forms a hardly perceptible dark border to the *Zostera* leaves on which it grows; but on the fragment of the host plant examined I found it fairly abundant, although mixed with species of *Ectocarpus* and *Chantransia*. Harvey's

figure (Phyc. Brit. pl. 322), though the colouring should have been purple, is, so far as it goes, a correct representation of the erect fronds, the grouping of them even suggesting that they arise from a common basal disc; but none is figured, nor is the nature of the attachment mentioned in the description. I found the short purple filaments described by Carmichael and Hooker always sprung from a well-developed monostromatic cellular basal disc, but I also found many apparently quite mature discs which bore no erect filaments, and which in every way resembled Berthold's figure of the discs of his *Erythrotrichia discigera*. The only other British specimens that I have seen that I can certainly refer to the same species are some gathered by Mr. E. M. Holmes on *Corallina officinalis* at Arbroath in September, 1890, and some others on *Zostera* sent to me last year from the Scilly Islands by Mr. E. George.

The specimens from Appin and Scilly are similar in all respects; those from Arbroath are longer and broader than the others. It is evident that Carmichael's plant cannot be referred either to *Erythrotrichia Boryana* Berth. or *E. ciliaris* Berth., but is, on the other hand, very closely related to *E. discigera* Berth. In *Die Natürlichen Pflanzenfamilien* of Engler and Prantl the late Prof. F. Schmitz has made *E. discigera* the type of a new genus—*Erythropeltis*—characterized by the horizontally expanded frond and marginal growth. In the diagnosis of the genus he makes no mention of erect filaments, and states that cell-division is confined to the marginal cells, and does not take place in any other cells of the thallus. Berthold, on the other hand, describes his *E. discigera* as very like *E. ciliaris*, but the filaments slightly more slender, not half as long, and arising in groups from a monostromatic disc, which is sometimes alone present. If Schmitz did not intend to exclude from his genus *Erythropeltis* plants which bore erect filaments, although only occasionally, it is difficult to see why he has excluded *E. obscura*, in which the disc is often all that is present. ("Aufrechte Thallom, höchstens 3 mm. lang, gewönlich kürzer, *oder auch fehlend* (*in Sommer vielfach*)," Berthold, Bang. p. 26.) I am inclined to think that Schmitz overlooked the fact that erect filaments are present in *E. discigera* Berth., and was consequently mistaken in supposing the specimens on which he founded the genus *Erythropeltis* belonged to the same species as Berthold's plant, though resembling it in many particulars. There can, I think, be no doubt that either *E. discigera* Berth. or *E. obscura* Berth. (which is said to differ from it by the darker colour, relatively larger cells, and occasional branching) rather than *E. ciliaris* Berth. is the plant described by Carmichael fifty years before, under the name *Bangia ciliaris*.

30. E. Bertholdii Batt. = E. ciliaris Berth. Bangiaceæ, p. 25 (non *Bangia ciliaris* Carm.). On *Zostera*, Scilly Isles, June, 1899; *E. George*. Amongst the plants sent to me last summer from the Scilly Isles by Mr. Edw. George were some leaves of *Zostera marina* covered with an *Erythrotrichia* which in every way agrees with Berthold's description of *E. ciliaris*. The cylindrical filaments are very slender below, gradually tapering from 10–12 μ at the base to a width of 60–70 μ in the widest part. A transverse section of the

upper part of the frond shows 4–8 cells radially arranged. Each individual filament is attached singly to the *Zostera* leaf by its slightly expanded basal cell. In many respects the plant resembles a *Bangia*, but the spores are formed exactly as in the other species of *Erythrotrichia*. As has been shown above, Berthold is wrong in referring the plant to *Bangia ciliaris* Carm. (for which the name *Erythrotrichia ciliaris* must be retained). I have been compelled in consequence to give it a new name, and have called it after the botanist who first clearly described it.

31. E. Boryana Berth. Bang. p. 25. Var. crispa, nov. var. Fronds pale purple, 10–20 mm. long, very slender below and formed of a single cell-row 10–15 μ broad, which by longitudinal and transverse division of the cells gradually expands into a very thin, flat, monostromatic frond 200–800 μ broad; margins crenate, more or less crisped and curled. On *Zostera*, in company with *E. Bertholdii*, &c., St. Mary's, Scilly, June, 1899; *E. George*.

I found this very pretty variety of *E. Boryana* growing in company with the preceding, on *Zostera* leaves sent from the Scilly Isles by Mr. George. The fronds are very much longer and broader than those of any other British specimens of the species that I have seen; and the margins, instead of being quite entire ("margini integerrima"), are notched and crisped, sometimes so much so that the frond appears spirally twisted.

32. Erythropeltis discigera Schmitz in Engler & Prantl, Pflanzenfamilien, Theil 1, Abtheilung 2, p. 313. Var. Flustræ, nov. var. Fronds rose-coloured, horizontally expanded, orbicular, becoming confluent and irregular in outline; discs 50–150 μ and more in diameter; cells rounded-polygonal, oblong or irregular in outline, 6–9 μ long by 3–6 μ broad; spores globose, about 9 μ in diameter. On *Flustra foliacea*, Deal, Nov. 1899; *J. T. Neeve*.

In a former part of this paper I have mentioned that Mr. J. T. Neeve, of Deal, sent me some *Flustræ* marked with hardly visible pink stains caused by the fronds of an *Erythropeltis*. Since last November he has kept me constantly supplied with fresh material. I have examined probably many hundred discs, but on none of them have I found any trace of erect fronds. The spores are formed in an exactly similar manner to those of *Erythrotrichia*. On several occasions I found that they had germinated, and begun to divide on the surface of the frond, just above the mother-cell from which they had been discharged, giving to it the appearance of containing several spores. I have little or no doubt that this plant is really a form of Schmitz's *Erythropeltis discigera*; but I cannot think it the same as *Erythrotrichia discigera* Berthold, although the fronds in many respects resemble the discs of that species when no erect fronds are produced.

II.—Florideæ.

33. Chantransia endozoica Darbish. in Bericht. der Deutsch. Bot. Gesellsch. 1899, Band xvii. p. 13, taf. 1. On *Alcyonidium gelatinosum* L., Valencia, Co. Kerry, Ireland; *Prof. F. E. Weiss*. On *A. hirsutum*, Alnmouth; *Dr. G. S. Brady*. This interesting

species has recently been found growing in company with a number of other minute algæ on *A. hirsutum* at Alnmouth by Dr. G. S. Brady, F.R.S. So abundant were the parasitic plants that the creature itself was quite masked by its deep red investment.

34. Halymenia latifolia Crn. Florule du Finist. p. 142, pl. 14, gen. 96. Blackhead, Antrim, Ireland; *Dr. Dickie*. In the National Herbarium at the British Museum there are two specimens of this species mounted on the same sheet and marked in the handwriting of the late Prof. G. Dickie, "Schizymenia Dubyi. Blackhead." The resemblance to *S. Dubyi* is of course only superficial; reference to the structure of the frond at once shows to what genus the plant belongs. The simple, quite undivided obovate frond distinguishes this species at sight from *Halarachnion ligulatum*.

35. Helminthocladia Hudsoni J. Ag. Sp. Alg. ii. p. 413; iii. p. 506. Tab. nost. figs. 15–16. Cullercoats, July, 1853; *Miss Dickinson*. On examining some small specimens of this species, scarcely more than an inch long, gathered at Cullercoats many years ago by Miss Dickinson, of Norham, I found that they bore cruciate tetraspores in abundance on the peripheral filaments. I am not aware that tetraspores have ever been observed previously in the genus *Helminthocladia*. It is worthy of note that the tetrasporic plants are very small and slender, compared with those bearing cystocarps, and it appears to me not improbable that the tetraspores (of *Nemalion*, *Helminthora*, &c.) may be found on similarly dwarfed specimens.

Rhodophysema, gen. nov. Fronds gregarious, minute, dark red, hemispherical, globose or pear-shaped, sometimes more or less plicate-rugose, composed of a medullary stratum of large, roundish-angular, colourless cells, becoming smaller towards the periphery, and a cortical portion formed of a few layers of small, coloured, closely packed cells, each containing several small disc-shaped chromatophores; tetraspores cruciate, borne in external convex sori, accompanied by slender, rigid, falcate, few-celled paraphyses. **Cystocarps and antheridia unknown.**

36. **R. Georgii**, sp. unica. Fronds purplish red, 100 μ–1 mm. in diameter, clustered in dense masses, more or less confluent, smooth, somewhat lubricous; cortical cells seen from above roundish polygonal, about 6 μ in diameter; sori 50–300 μ broad; tetraspores oblong, sessile, 20–36 μ long, 14–18 μ broad; paraphyses 3–4-celled, falcate, somewhat clavate, cells 6–9 μ long, 3–4 μ broad; antheridia and cystocarps unknown. Tab. nost. figs. 8–13.

On *Zostera*, fringing the margins of the leaves with an almost continuous purplish-red border. Scilly Islands, June, 1899, and May, 1900; *E. George*.

I detected this very curious and interesting alga on some leaves of *Zostera marina* sent to me from the Scilly Islands last year by Mr. George. Very few specimens, and those small and scattered at long intervals along the margin of the *Zostera* leaves, were found last year; but in the spring of the present year Mr. George has found the plant in abundance, forming an almost unbroken border

to the *Zostera* leaves, and in most cases accompanied by *Punctaria latifolia* and species of *Erythrotrichia* and *Ectocarpus*. The fronds at first appear as minute convex protuberances on the margin, or more rarely on the surface, of the *Zostera* leaf; but they soon swell into globose or pear-shaped fronds, occasionally solitary, but much more commonly clustered in dense masses for a distance of several inches along the edge of the upper portion of the leaf. The sori are borne on fronds of all ages, and greatly resemble those of *Rhododermis*. The systematic position of the genus is doubtful.

I have dedicated the species to my friend Mr. George, an indefatigable collector, to whom, as this paper proves, I am deeply indebted not only for beautiful specimens of the present plant, but for other rare seaweeds from the Scilly Islands and elsewhere. Mr. George's fine collection of marine algæ, with its sets of magnificent specimens, the reward of assiduous collecting continued for many successive years, is but little known to botanists; but it is in vain that I have repeatedly urged my friend to publish his notes.

Erythrodermis, gen. nov. Fronds membranaceous, horizontally expanded, orbicular or indefinite in outline, adhering closely to the substratum, monostromatic or composed of very few layers of polygonal cells arranged in dichotomous rows, flabellately radiating from several points. Chromatophores small, disc-shaped, several in each cell; tetraspores cruciate, arranged in moniliform, simple or forked filaments, which are packed together in external convex nemathecia. Antheridia and cystocarps unknown.

37. **E. Alleni,** sp. unica. Characters those of the genus. Fronds 6–7 mm. in diameter, and about 15 μ in thickness; cells 6–12 μ long, 6–9 μ broad; nemathecia slightly elevated, about 1 mm. in diameter; nemathecial filaments simple or branched, each formed of 4–6 tetraspores, 9–12 μ in diameter. Tab. nost. figs. 3–7.

On pieces of broken earthenware dredged from 4–6 fathom water, Queen's Ground, Plymouth, March, 1900.

I found this interesting and beautiful little plant on some bits of broken earthenware sent to me, amongst some shells, stones, &c., with algæ attached to them, from the Plymouth Laboratory. The fronds resemble those of *Rhododermis elegans* in size, colour, and structure, but the tetraspores are borne in true nemathecia, not unlike those of *Phyllophora membranifolia*. I do not know of any other incrusting alga with similar nemathecia. Until the cystocarps are discovered, the systematic position of the genus must remain doubtful, like that of *Rhododermis*. I have dedicated the species to Mr. E. J. Allen, the able Director of the Plymouth Laboratory.

38. Dermatolithon hapalidioides Foslie = Melobesia hapalidioides Crn. Fl. Finist. p. 150. Berwick-on-Tweed, Jan. 1887; *E. A. B.* West coast of Ireland; *Foslie*.

39. Melobesia zonalis Foslie = Hapalidium zonale Crn. Fl. Finist. p. 149. Plymouth, April, 1897; *E. A. B.*

40. Lithophyllum Crouani Foslie, "Some new or critical Lithothamnia," p. 17. Berwick, Feb. 1889; *E. A. B.*

I take this opportunity of illustrating, together with the new genera described in this paper, some algæ recently described by me in this Journal, but of which no figures were given at the time of publication.

Explanation of Plate 414.

Figs. 1–2. *Porphyrodiscus simulans* Batt.:—1. Transverse section of frond through a sorus × 50. 2. Portion of same, × 500.

Figs. 3–7. *Erythrodermis Alleni*:—3. Transverse section of frond with nemathecia, × 200. 4–5. Simple and branched nemathecial filaments, × 500. 6. Transverse section through edge of sorus, × 500. 7. Surface cells, × 300.

Figs. 8–13. *Rhodophysema Georgii*:—8. Plant, nat. size, on *Zostera* leaf. 9. Cluster of fronds, × 10. 10. Section of frond, × 50. 11. Ditto of young frond, × 50. 12. Tetraspores and paraphyses, × 500. 13. Surface cells, × 200.

Fig. 14. *Trailliella intricata* Batt.:—14. Branch with tetraspores, × 100.

Figs. 15 & 16. *Helminthocladia Hudsoni* J. Ag.:—15. Tetrasporic plant, nat. size. 16. Peripheral filaments with tetraspores, × 600.

Fig. 17. *Rhodochorton Brebneri* Batt.:—17. Tetrasporic branch, × 300.

Figs. 18–22. *Neevea repens*:—18. Plant *in situ*, × 10. 19. Portion of same, × 300. 20. Part of frond after the escape of the spores, × 300. 21. Germinating spores, × 300. 22. Young frond, × 300.

RANUNCULUS ACER L.

By Frederick Townsend, M.A., F.L.S.

In the *Journal of Botany* for 1889, p. 140, I published a short paper giving the late Prof. Kerner's views of the specific characters and forms of *Ranunculus Steveni* and *R. acer* L.* He recognized these as two species, one with and one without a creeping root, and described three forms of the latter, one of which—viz. *R. Friesianus* Jord.—he considered identical with *R. Steveni* Andrz., whereas other botanists believe them to be distinct and to represent two subspecies.

Dr. Boswell Syme, in the third edition of *English Botany*, seems to have recognized three forms or subspecies, though he corrects his naming in his Report of the Lond. Bot. Exch. Club, reprinted in Journ. Bot. 1869, p. 137. The third subspecies alluded to is *R. Friesianus* Jord. Engl. Bot. ed. iii. vol. i. p. 39, the first two being *R. Boræanus* Jord. and *R. Steveni* Andrz. Messrs. Rouy and Foucaud, in their *Flore de France* now in course of publication, also recognise the same three subspecies, and their arrangement of these and of several forms seems to be worthy of notice by our English botanists. The three subspecies are *R. Boræanus* Jord., *R. Steveni* Andrz., and *R. Friesianus* Jord.

Under Subspecies I., *R. Boræanus*, Messrs. Rouy and Foucaud describe four forms, *viz.*:—(1) *R. Boræanus* Jord. (pro specie), with one var., *β tomophyllus* Jord. (pro specie); (2) *R. rectus* Bor. (pro specie), with one subvar., *pumilus*; (3) *R. stipatus* Jord. (pro specie); and (4) *R. pascuicolus* Jord. (pro specie).

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* A clerical error in that paper may here be noticed and corrected: line 18 from the top, for "Linneus" read "Fries."

Under Subspecies II., *R. Steveni*, only one form is recognized and described.

Under Subspecies III., *R. Friesianus*, three forms are described: (1) *R. vulgatus* Jord. (pro specie); (2) *R. Friesianus* Jord. (pro specie); (3) *R. nemorivagus* Jord. (pro specie).

I have prepared the following dichotomous table of subspecies and forms, followed by descriptions in full which do not pretend to be a literal translation of the text of Messrs. Rouy and Foucaud. I have, in places, taken considerable liberty with the latter, so the authors must not be held responsible for any departure from the original. I may here add that I have myself gathered *in situ* all the subspecies and forms, and that I am indebted to Mons. Rouy for his examination of my collection.

Dichotomous Table of Subspecies and Forms.

Lobes of the leaves overlapping or their borders touching, or cut into narrow sublinear segments 1.
Lobes of the leaves not overlapping, nor their borders touching, nor cut into narrow sublinear segments . . . . . 2.

1. Lobes overlapping, longer than broad, finely divided into narrow sublinear segments, rootstock short, thick, rhizome none or, if any, coarse and thick *Boræanus*.

Var. *β tomophyllus* Jord. (pro specie). Plant densely covered with soft hairs, rootstock less short.

Lobes touching or overlapping, nearly or quite as broad as long, not cut into narrow linear segments, root creeping . . . . . 4.

2. Lobes much longer than broad, rootstock short, thick, oblique . . . . . 3.
Lobes nearly as broad as long, rootstock creeping, more or less horizontal . . . . . *Steveni*.

3. Plant generally distributed in pastures, &c. Lobes broader, less cut and more oblong-cuneiform than *R. Boræanus* . . . . . *rectus*.

One subvar., *pumilus* Rouy & Fouc. Plant dwarf, few-flowered (*R. parvulus* Clairv., non L.).

Plant alpine, smaller than the last, leaves less divided, divisions more unequal, those of the lower stem-leaves often stalked . . . . . *stipatus*.
Plant alpine, very similar to the last, but the divisions of the leaves broader, carpels smaller, less numerous, and with shorter beak . . . *pascuicolus*.

4. Lobes of leaves very broad and overlapping so as to leave little or no sinus at the base of the lobes *nemorivagus*.
Divisions of lobes less broad, lobes touching or overlapping, but with evident sinus . . . . 5.

5. Lobes touching or overlapping, beak of carpels strongly hooked, hook persistent . . . . . *vulgatus*.
Lobes of leaves overlapping, beak of carpels less hooked, hook evanescent . . . . . *Friesianus*.

R. ACER L. Spec. 779 (sensu lato); G. et G. Fl. Fr. i. p. 32; Gren. Rev. Fl. Jura, p. 27; Lamotte, Prodr. Fl. Plat. Centr. p. 47.—Rootstock with or without rhizome, producing buds furnished with acuminate or subobtuse hairy or villous scales. *Root-leaves pentagonal*, more or less deeply palmatipartite, primary lobes subrhomboidal, divisions more or less broad, more or less narrow; upper stem-leaves tripartite, divisions linear. *Peduncles terete.* Sepals villous. *Carpels 20–30, glabrous, compressed, with more or less hooked beak*, beak *less* than half the length of the carpel. 4.—May–July.

Three subspecies.

SUBSPECIES I.—R. BORÆANUS. Rootstock short, often fascicled, rhizome very short or none, perpendicular or oblique, surrounded by numerous fibres the remains of former petioles, root-leaves on long petioles, deeply palmatipartite, primary lobes longer than broad, ultimate divisions numerous narrow.

Form I. *R. Boræanus* Jord. (pro specie), Obs. Fragm. 6, p. 19; Diagn. p. 71; Bor. Fl. Centre, ed. 3, p. 16; Gren. Rev. Fl. Jura, p. 27; Lamotte. *l. c.* p. 48; *R. acer* L.! (sensu stricto), Hort. Cliffort. p. 231, no. 18; Freyn, *l. c.* p. 939; *R. acris* var. *multifidus* DC.; *R. Neapolitanus* Crantz, non Ten.; *R. napellifolius* Crantz, non DC.*—Exsicc.: Bill. nos. 1105 et 3504; Reliq. Maill. no. 153; Soc. Dauph. no. 2733. — Rootstock none premorse, or very short and more or less perpendicular or oblique, often fascicled, root-leaves very deeply palmatipartite, primary lobes overlapping, much longer than broad, divisions very narrow, cut into numerous sublinear segments, stems often numerous, usually with little pubescence. Beak of carpels short. I have gathered this in Hampshire, Sussex, Surrey, Warwickshire, Worcestershire, Gloucestershire, Aberdeenshire, Inverness-shire.

β tomophyllus Jord. (pro specie) Diagn. p. 71; Gren. *l. c.* p. 27.—Base of stem and petioles densely clothed with spreading or reflexed fulvous hairs, rootstock with shortly developed oblique rhizome. This I have gathered in Surrey, Devon, Berkshire, Worcestershire, Aberdeenshire, and Inverness-shire.

Form II.—*R. rectus* Bor. (pro specie) Fl. Centre, ed. 3, p. 15 (J. Bauh. Hist. 3, p. 416, fig. 1); Lamotte, Prodr. Fl. Pl. Centr. p. 47; *R. silvaticus* Thuill. Fl. Paris (p. p.); *R. acris* Reich. Icon. fig. 4606; Cus. et Ansb. Herb. Fl. Fr. 1, t. 85.—All the divisions of the leaves wider, primary lobes more oblong-cuneiform, their borders not touching; rootstock more prolonged; beak of carpels longer.—This I have gathered in Hampshire, Surrey, Sussex, Gloucestershire, Warwickshire, Cumberland, Aberdeenshire. It has been gathered in Shetland by Mr. Beeby.

Subvar, *pumilus*.—Plant dwarf, few-flowered (*R. parvulus* Clairv., non L.). Mr. Beeby has communicated plants he gathered in Shetland.

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* Crantz's names are much older than those of De Candolle and of Tenore, but the names of the latter have been universally adopted for well-established species, so that the adoption of Crantz's names on the authority of precedence would only cause detrimental confusion.

Form III.—*R. stipatus* Jord. (pro specie) Diagn. p. 72; *R. cammarifolius* Arv.-Touv. Essai Pl. Dauph. p. 21.—Exsicc.: Soc. Dauph. no. 2736.—Plant alpine, shorter than the preceding; divisions of the leaves more unequal, less numerous, and the lower stem-leaves often petioled; carpels clearly but shortly beaked, peduncles stout. I have gathered this in Switzerland and Tyrol.

Form IV.—*R. pascuicolus* Jord. (pro specie) Diagn. p. 73; *R. rivularis* Arv.-Touv. Notes, 1883, p. 24, non Banks et Sol.—Plant alpine, nearly related to the last, but differs in the divisions of the leaves being a little wider and suboblong, with smaller flowers and smaller less numerous carpels, with the beak more hooked. I have gathered this in Switzerland in Cantons Berne and Valais.

Subspecies II.—R. Steveni Andrz. (pro specie) Ap. Bess. Cat. Pl. Volhyn, pp. 22–23; Bor. Fl. Centr. ed. 3, p. 15; Reichb. Icon. i. f. 4605: Gren. Rev. Fl. Jura, p. 28; Freyn, *l. c.* p. 938; *R. silvaticus* Thuill. Fl. Paris (p. p.); *R. acris* Jord. Observat. Fragm. 6, pp. 15–17, non L. nec auct. plur.—Rootstock with *prolonged* oblique or horizontal rhizome covered with long hairs. Plant villous, hairs patent, at least on the petioles, stems few, *leaves* more or less *broad*, reniform-cordate, *less deeply 3–5-partite*, *lobes ovate-cuneiform*, borders not overlapping.—Habit of *R. nemorosus* f. *Amansii*. I have gathered this in Worcestershire and Wiltshire, and have specimens gathered by Mr. Beeby in Shetland. I have also gathered it at Luchon in the Pyrenees, and at Weissenstein in Switzerland.

Subspecies III.—R. Friesianus. *Rootstock* with oblique or subhorizontal *prolonged* rhizoma, more or less covered with fibres; *radical leaves* more or less hirsute, shortly petioled, short, *broad*, *suborbicular*, with broad lobes, *less* deeply cut, borders of lobes touching or overlapping.

Form I.—*R. vulgatus* Jord. (pro specie) ap. Bor. Fl. Centre, ed. 3, p. 15. — Beak of carpels strongly hooked, persistent, leaves with whitish pubescence, primary lobes of root-leaves more or less touching, rather deeply toothed, rootstock and rhizome somewhat slender, with few fibres. I have gathered this in Yorkshire, Carnarvonshire, and Aberdeenshire. I have it from Shetland, and also have it from Orleans.

Form II.—*R. Friesianus* Jord. (pro specie) Observat. Fragm. 6, p. 17; Fl. Centre, ed. 3, p. 16.—Beak of carpels much less hooked than the last, leaves greener, with shorter teeth, borders of the primary lobes of root-leaves overlapping above, but with sinus below, rootstock thicker than the last and with more fibres. I have this from Shetland, communicated by Mr. Beeby, and named by Mons. Rouy. I have also gathered it in Canton Vaud, in Switzerland.

Form III.—*R. nemorivagus* Jord. (pro specie) Diagn. p. 74, excl. syn.; Lamotte, *l. c.* p. 48.—Similar in habit to the last, but borders of primary lobes of root-leaves completely overlapping, leaving little or no sinus below. I have gathered this in Canton Vaud in Switzerland.

Thus all the subspecies, but not all the forms, are native in Great Britain. The native forms are—*R. Boræanus* and the var. *tomophyllus*; *R. rectus* and the subvar. *pumilus*; *R. Steveni*; *R. vulgatus*; *R. Friesianus*.

I have no knowledge that the forms *R. stipatus*, *R. pascuicolus*, or *R. nemorivagus* have been found in Great Britain or Ireland. In the recent issue of Desiderata published by the Bot. Exch. Club *R. Friesianus* is added; though it has recently been found in Shetland by Mr. Beeby, I am not aware that it has been detected elsewhere in Great Britain.

In practice I find that the forms can be recognized principally by the root-leaves and the rootstock, but assisted by other characters. Intermediate forms naturally and certainly do occur. I find these between *R. Boræanus* and *R. rectus*; it must be recollected that forms, though of higher grade than varieties, are nevertheless of lower grade than subspecies, and as regards the latter I feel that, in my own case, more extended observation is requisite to form a decided opinion as to whether the forms described in this paper satisfactorily group themselves into definite subspecies. I do not find that the form of the beak of the carpels can be depended upon as a distinguishing character, if we except that of *R. vulgatus*, which appears to be uniformly strongly hooked, the hook being persistent; and I may say that the same uncertainty attends the form of the scale of the petals, and the comparative presence or absence and direction of hairs on the stem; but characters which may be inconstant in small areas where different forms are associated may be more constant in a prevailing form within a large area.

THE EUROPEAN SPHAGNACEÆ

(AFTER WARNSTORF)

By E. CHARLES HORRELL, F.L.S.

(Continued from p. 353.)

§ VII. SPHAGNA SUBSECUNDA Schimp.

Branch-leaves very small, small, medium size to very large, oval, elongate-ovate, lanceolate or roundish-oval; toothed on the narrowly or broadly truncate apex, border narrow or wide; margin widely inrolled either only in the upper half or to the base; closely or loosely imbricate, frequently secund; when dry without lustre or slightly shining. Chlorophyllose cells in section generally median, rectangular or barrel-shaped and free on both surfaces, more rarely triangular or trapezoid and then nearer either the inner or the outer surface. Hyaline cells always with numerous fibrils; the inner surface where united to the chlorophyllose cells always smooth. Pores very small to small, and frequently with a strong border; in most cases forming rows like strings of pearls on the commissures, either numerous on the outer or on the inner

surface of the leaf, more rarely with few pores on both surfaces or with numerous pores on both; only in *S. Pylaiei* are the pores altogether absent. Stem-cortex generally in one or two layers, more rarely in two to several layers, cells of median width to wide, thin-walled; in rare cases with thinnings or pores in the outer wall, non-fibrillose. Stem-leaves sometimes small, sometimes of medium size, sometimes very large; border narrow or wide, generally of equal width throughout, more rarely somewhat wider towards the base; hyaline cells very frequently with numerous fibrils and pores; apex narrowly or widely truncate and toothed or somewhat fimbriate. Colour grass- or grey-green, light- or golden-yellow, dark violet to blackish or red-brown, never purple.

The section comprises some forty or fifty species, of which eleven are inhabitants of Europe.

In the examination of plants belonging to this section it is important that both the branch- and the stem-leaves should be selected from the upper part of the stem, just below the capitulum.

33. S. CONTORTUM (Schultz.) Limpr. non Nees et Hornschuch.

Syn. *S. laricinum* Spruce MSS. 1847; *S. contortum* ♂ *laricinum* Wils. Bryol. Brit. 1855, 23; *S. neglectum* Angstr. 1864; *S. curvifolium* (Wils. MSS.) Hunt, 1867.

Exsicc. Braithw. Sphagn. Brit. Exsicc. No. 13 (1877).

Tufts generally loose, 7–15 cm. in height (submerged forms up to 30 and 40 cm. long and generally more slender), pale greyish green to light green or dark green, frequently variegated with brown or light yellowish brown to dark brown or blackish, sometimes somewhat violet.

Stem generally rigid and dark-coloured, rarely greenish. *Stem-cortex* in two to three layers (rarely in four). *Wood-cylinder* colourless or more frequently brownish red to dark brown.

Fascicles with two to five branches, the two to three spreading generally drepanocladous, sometimes longer, sometimes shorter; leaves generally rather closely arranged but not closely imbricate, frequently secund.

Branch-leaves small, generally narrow-ovate to ovate, ·7–1·5 mm. l ng; on the pendent branches lanceolate; somewhat concave with the margin incurved above, when dry frequently weakly undulate. Pores very small, weakly ringed and generally few in number. On the outer surface generally scattered, rarely forming rows, on the inner surface either quite without pores or with a few in the upper part of the leaf.

Stem-leaves small, triangular-lingulate, generally with the margin incurved above, apex rounded and weakly fimbriate, ·6–1·4 mm. long, generally 1 mm. long, very rarely up to 2 mm. long and then lingulate. Border generally widened below. Non-fibrillose or with a few fibrils in the upper third. Pores on the outer surface very few and very small; on the inner surface larger, non-bordered, and generally only near the apex or in the upper third. Hyaline cells very rarely septate.

Dioicous. Perichætial bracts oblong, with the apex acuminate, border of equal width all round, hyaline cells in the upper part rarely

with fibrils and small pores. Spores rust-coloured, 28-32 μ in diameter, finely papillose.

Hab. In very wet places, and especially in deep peat bogs, rarely floating.

Distrib. Throughout Europe; N. America. Petty Pool, Vale Royal, Cheshire (*Whitehead*); near Over, Cheshire (*W. Wilson*); Barbon Low Fell, Westmoreland (*Barnes*); Grayrig, Westmoreland (*Barnes*); Penzance, Cornwall (*Ley*); Newbridge Bog, Ashdown Forest, Sussex (*Nicholson*).

34. S. PLATYPHYLLUM Warnst. in Flora, 1884, 481.

Syn. *S. auriculatum* Angst. in Oefv. Vet. Akad. xxi. 1864, 203 (non Schimp.); *S. subsecundum β isophyllum* Russ. Beitr. zur Kenntn. der Torfm. 1865, 71, *ex parte*; *S. laricinum* varr. *teretiusculum*, *platyphyllum* et *cyclophyllum* Lindb. in Not. ür Sällsk. pro Fauna et Fl. Fenn. xiii. 1874, 402. *S. laricinum* var. *subsimplex* Lindb. Musci. Scand. 1879, 11.

Exsicc. Braithw. Sphagn. Brit. Exsicc. No. 14.

Tufts very loose, stems 7–25 and 30 cm. high, pale green, green, greenish yellow or whitish yellow, brownish green to dark dirty green or dirty brown.

Stems soft, thin, colourless or brownish; *cortex* in 1½ to 2 layers, rarely in three layers.

Fascicles consisting of from 1–3 branches, which are generally short and thick, but sometimes thin and of medium length; leaves loosely arranged, or sometimes when dry imbricate and very concave and swollen.

Branch-leaves large, ovate to broadly ovate-oval, with the apex rounded and indistinctly toothed, very concave, with the margin inrolled in the upper half or all round; generally 1·8 mm. long and 1·2 mm. wide; sometimes, however, up to 4 mm. in length. Hyaline cells either relatively short, and rhomboid or rectangular, or longer and bluntly spindle-shaped and somewhat sigmoid. *Pores* on the outer surface either small and scattered and intermingled with pseudopores, or larger and more numerous and arranged in rows on the commissures. On the inner surface with scattered pores mixed with numerous pseudopores. Fibrils strong and numerous throughout the leaf.

Chlorophyllose cells in section generally barrel-shaped, sometimes very wide.

Stem-leaves sometimes resembling the branch-leaves in form, size, and pore-structure, sometimes broadly lingulate-ovate, with rounded apex, fibrillose in the upper two-thirds to three-fourths. The stem-leaves are frequently larger than the branch-leaves, and have a larger number of pores both on the outer and the inner surfaces. Hyaline cells here and there septate. Dioicous.

Hab. In peaty bogs.

Distrib. Europe, rare; Russia, Denmark, Scandinavia, Germany, Wales; Asia; N. America. Aber, Carnarvonshire (*Holmes & George*).

35. S. SUBSECUNDUM Limpr. Laubm. i. 1885, 119.

Syn. *S. subsecundum* Nees in Sturm, Deutschl. Flora, ii. 1819, *pro parte*. *S. contortum* var. *subsecundum* Wils. Bryol. Brit. 1855, 22.

Exsicc. Braithw. Sphagn. Brit. Exsicc. No. 15 *a* (*pro parte*).

Tufts loose and soft, dark brownish green, yellow or reddish yellow, rarely green alone. Stems woody, but thin and delicate, with the branches generally densely arranged with loose, rarely crisped capitulum.

Wood-cylinder well developed, generally brown.

Stem-cortex in one layer, with scattered pores on the walls.

Stem-leaves generally very small, less than 1 mm. in length, triangular-lingulate, almost always non-fibrillose, rarely with rudimentary fibrils in the upper third, hyaline cells generally non-septate; pores on the inner surface in the upper third rather large, non-ringed or weakly ringed and rather numerous, on the outer surface fewer in number, smaller and more strongly ringed, and generally in the cell-angles.

Fascicles consisting of 3–5 branches, 2–3 spreading, short, acuminate, and frequently recurved; leaves loosely arranged and near the apex secund.

Branch-leaves very concave, ovate, shortly acuminate, narrowly bordered, margin inrolled above, strongly fibrillose; pores on the entire outer surface very numerous, small, round and strongly bordered, arranged in rows on the commissures; on the inner surface with very few pores scattered here and there or none.

Chlorophyllose cells in section median, free on both surfaces, barrel-shaped to rectangular; lumen oval.

Dioicous; male branches brownish green, yellow to reddish yellow. Perichætial bracts ovate, with rounded apex, border of equal width all round, formed of both kinds of cells, hyaline cells in the upper part of the leaf rhomboid, non-fibrillose, with scattered pores. Capsule small, spores 28–32 μ, yellow, finely papillose.

Hab. In wet places in deep bogs.

Distrib. Throughout Europe; Asia; N. America. Brookwood, Surrey (*Sherrin*); Widdy Bank Fell, Teesdale, Durham (*Horrell*); Aldershot, Hants (*Sherrin*); Shappen's Moss, Brockenhurst, Hants (*Ley*); Stockton Forest, W. York (*Stabler*).

S. subsecundum Limpr. does not appear to be very common in Britain, most of the plants under this name in herbaria belonging to *S. rufescens* Warnst. or some other of the numerous segregates. *S. subsecundum* in the restricted sense is almost always a much more delicate plant than most other forms, and is less frequently found floating or completely submerged.

36. S. INUNDATUM Warnst. *in litt.* (1895) *teste* Cardot in Répertoire Sphagn. 1897, 81.

Syn. *S. inundatum* Russ. Zur Kenntniss, &c. 1894, 45, *ex parte*; *S. subsecundum* varr. *contortum* et *obesum* Auct. *ex parte*.

Exsicc. Braithw. Sphagn. Brit. Exsicc. No. 15 *b*.

Plants more robust than *S. subsecundum*, but generally less so than *S. Gravetei* and *S. rufescens*, completely submerged or in very wet places. Generally green, or with some admixture of purple.

Wood-cylinder strongly developed, dark brown.

Stem-cortex in one layer.

Stem-leaves of medium size, from 1 mm. to 1·4 mm. in length, lingulate, obtuse and rounded at the finely toothed apex, always fibrillose in the upper half, rarely to the base; hyaline cells generally septate; pores on the inner surface numerous, round, weakly or strongly ringed above, and non-ringed towards the base, on the outer surface very few or more numerous, ringed and situated in the cell-angles.

Fascicles of 3–5 branches, the 2–3 spreading, recurved or straight, rather short and acuminate, with the leaves loosely imbricate or spreading, sometimes closely imbricate, frequently more or less secund.

Branch-leaves small to medium size, ovate, obtuse and toothed at apex, concave, with margin incurved above, strongly fibrillose, pores on the outer surface small and strongly ringed, very numerous and in rows on the commissures, or sometimes few; on the inner surface very few or none.

Chlorophyllose cells in section rectangular, with the thickened walls free on both surfaces; lumen median, oval.

Hab. Submerged or in very wet places in moorland pools.

Distrib. Probably widely distributed throughout Europe and N. America. Pirbright Common, Surrey (*Sherrin & Horrell*); Treugwainton Bog, Penzance (*Curnow*); Strensall, York (*Ingham*); Auchmore Burn, Killin (*Cocks*).

37. S. Gravetii Warnst. in Verh. d. Bot. Ver. d. Prov. Brandenb. xli. 1899, 32.

Syn. *S. Gravetii* Russ. Arch. Naturk. Liv. Est. und Kurlands, ser. 2, Bd. x. Lfg. 4, 1894, 423, pro parte. *S. subsecundum* Auct.

Exsicc. Braithw. Sphagn. Brit. Exsicc. 1877, No. 19*c* (sub nom. *S. subsecundo* var. *auriculato*).

Tufts generally very robust, resembling a large *S. rufescens*, sometimes less robust and resembling *S. subsecundum;* submerged or in very wet places, green above, brownish or pale below, sometimes with red or purple intermixed.

Wood-cylinder strong, generally brown.

Stem-cortex in one layer.

Stem-leaves very large, from a narrower base, broadly lingulate, toothed on the widely truncate apex, border narrow, fibrillose to the base, on the inner surface almost without pores and only with scattered small pores near the lateral margins, on the outer surface numerous, in rows on the commissures.

Fascicles of 3–4 branches, 2 or 3 stronger spreading, rather short, acuminate, leaves loosely arranged. *Branch-leaves* of medium size, ovate-lanceolate, concave, with inrolled margin, toothed at the truncate apex, pores on the outer surface very numerous, in rows on the commissures, on the inner surface very few.

Chlorophyllose cells in section rectangular, free on both surfaces, lumen oval.

Hab. In boggy pools.

Distrib. Germany; England; Wales. Broadgate Bog, Staveley, Westmoreland (*Barnes*); Nant Pedor, Carmarthenshire (*Ley*).

38. S. RUFESCENS Warnst. in Hedwigia, 1888, 267.

Syn. *S. rufescens* Nees & Hornsch. Bryol. Germ. i. 15, 1823, pro parte. *S. subsecundum* varr. *contortum*, *squarrosulum*, *auriculatum* et *laxum* Auct. pro parte.

Exsicc. Braithw. Sphagn. Brit. Exsicc. 1877, Nos. 15*a* pro parte (sub nom. *S. subsecundo*), 16 and 16*b* (sub nom. *S. subsecundo*, pl. masc.), 17 (sub nom. *S. subsecundo* var. *contorto*), 17*b* (sub nom. *S. subsecundo* var. *contorto* f. *rufescente*), 19 (sub nom. *S. subsecundo* var. *auriculato*), 18 and 18*b* (sub nom. *S. subsecundo* var. *obeso*).

Plants varying greatly in habit, frequently submerged, and then at times exceedingly robust and tumid, sometimes little larger than *S. subsecundum ;* branches frequently contorted; colour very various, light to dark green, frequently variegated with red and purple, sometimes brown to almost black.

Wood-cylinder strongly developed, generally dark brown.

Stem-cortex in one layer.

Stem-leaves large to very large, lingulate or oval-lingulate, always fibrillose in the upper half, rarely almost to the base; hyaline cells usually septate; either only on the outer surface with very numerous strongly ringed pores arranged in rows on the commissures, with sometimes near the apex a row in the middle of the cell-wall also, and on the inner surface with fewer weakly-ringed, towards the base non-ringed pores, or with very numerous pores on both surfaces.

Fascicles of 3–4 branches, of which the 2–3 spreading ones are generally short and obtuse, but very tumid from the very large loosely imbricate leaves, sometimes very short, sometimes longer and more pointed; *branch-leaves* generally very large, tumid, concave, with inrolled margin, ovate-oblong, with a narrower base and truncate and toothed apex, sometimes much smaller and more acuminate, frequently secund; border narrow and of equal width throughout; hyaline cells usually septate; pores on the outer surface very numerous, small or larger, generally in regular rows on the commissures, on the inner surface either equally numerous and in rows, or fairly numerons and in almost every cell-angle.

Chlorophyllose cells in section median, barrel-shaped to rectangular, free on both surfaces of the leaf, lumen oval and centric; walls non-papillose.

Hab. Most frequently submerged in moorland pools, sometimes in bogs or on dripping rocks.

Distrib. Throughout Europe; Asia; Africa; N. America. *S. rufescens* is by far the commonest *Subsecundum* species in this country. Trelleck Bog, Monmouth (*Ley*); Little Brickhill, Bucks (*Saunders*); Keston Common, Kent (*Cocks*); Hole Common, near Lyme Regis, Dorset (*Miss Lister*); Pirbright Common, Surrey (*Sherrin*); Wimbledon Common, Surrey (*Mayes*); Chyandal Moor, Penzance (*Curnow*); Wyre Forest, Worcestershire (*Collins*); Broadgate Bog, near Staveley, Westmoreland (*Stabler*); Darnholme, Goathland, N.E. Yorksh. (*Anderson*); Beamsley, Yorksh. (*West*); Adel, Yorksh. (*West*); Fishpool, Delamere, Cheshire (*Whitehead*); Aldershot, Hants (*Sherrin*); Islay (*Ley*); Oakmere, Cheshire

(*Wilson*); Widdy Bank Fell, Teesdale, Durham (*Horrell*); Tilgate Forest, Sussex (*Horrell*); Theydon Bois, Epping Forest, Essex (*Horrell*); Linwood Warren, Market Rasen, Lincolnsh. (*Allen*); Carn Galva Moor, Cornwall (*Curnow*); Sleights Moor, Yorksh. (*Anderson*); Lyndhurst Bog, Hants (*Ley*); Shappen Bog, near Brockenhurst, Hants (*Ley*); Glen Rosa, Arran (*Ley*); Alt Goch, Radnor (*Ley*); Ceunant Llenyrch, Merionethsh. (*Jones & Horrell*); Hawk Bog, Carmarthen (*Ley*); Roseberry Topping, N.E. Yorksh. (*Horrell*); near Budleigh Salterton, Devon (*Ley*); Llanwrtyd Wells, Brecon (*Painter*); Skipwith Common, York (*Ingham*).

39. S. AQUATILE Warnst. in Verh. d. Bot. Ver. d. Prov. Brandenb. xli. 1899, 31.

Syn. *S. subsecundum* Auct. pro parte.

Plants closely resembling in habit a robust *S. rufescens*; green in the upper part, with more or less violet intermixed; the greater part submerged.

Stem-cortex in one layer.

Wood-cylinder whitish or pale yellowish.

Stem-leaves lingulate, toothed on the broadly truncate apex, border narrow and of equal width all round, 1·86 mm. long and 1 mm. wide; hyaline cells fibrillose to the base, in the basal half here and there septate, on the inner surface with numerous small bordered pores in rows on the commissures, on the outer surface, on the contrary, with only a few scattered pores in the cell-angles; in the lower part of the leaf on both sides with pores in the upper cell-angles only.

Fascicles generally with three branches, of which the two stronger are spreading, up to 10 mm. long, loosely leaved and gradually acuminate; *branch-leaves* of medium size, ovate-lanceolate, toothed on the truncate apex, border narrow, concave, margin widely inrolled, when dry erecto-patent, when wet loosely imbricate. Hyaline cells with numerous fibrils, on the outer surface with numerous small ringed pores in rows on the commissures, on the inner surface with similar pores, but fewer in number and not in rows.

Chlorophyllose cells in section rectangular to almost barrel-shaped, median, free on both surfaces; hyaline cells concave on both surfaces.

Hab. Submerged in moorland pools.

Distrib. Germany; England; Wales. Whitmoor, W. Lancs. (*Wilson & Wheldon*); between Talsarnau and Maentwrog, Merionethsh. (*Jones & Horrell*); Langdon Beck, Durham (*Ingham*).

40. S. CRASSICLADUM Warnst. Bot. Centralbl. xl. 1889, 165.

Exsicc. Braithw. Sphagn. Brit. Exsicc. 1877, No. 19 *a* (sub nom. *S. subsecundo* var. *auriculato*).

Generally completely submerged or with the upper part above water; very robust, and resembling in habit *S. cymbifolium* or a long-branched *S. rufescens*; in the upper part greyish green, below paler or brownish.

Stem-cortex in one layer, cells very thin-walled, on one side of the circumference sometimes much wider than on the other, non-porose.

Wood-cylinder pale, yellowish or brown.

Stem-leaves large, widely oval-lingulate, slightly concave, somewhat fimbriate on the rounded apex; border of equal width all round, 4–5 cells wide. Hyaline cells generally fibrillose to the leaf-base; on the inner surface in the upper two-thirds with numerous small strongly-ringed pores on the commissures; on the outer surface with small pores in the upper, or the upper and lower cell-angles only, or sometimes in the lateral angles also; the cells above the base only with a single pore in the upper cell-angle, and with oblique cross-walls here and there.

Fascicles with generally three branches; the two spreading thick and long and shortly pointed, the branches of the capitulum short and obtuse, round and with the leaves closely arranged. *Branch-leaves* very large, broadly round- to oblong-ovate, almost flat and with the margin not inrolled; apex broadly truncate and with 7–9 teeth; border of 3–5 rows of cells; when dry somewhat shining and frequently slightly undulate at the margin. Hyaline cells with numerous fibrils. Pores on the inner surface numerous, small, strongly ringed, in rows on the commissures; on the outer surface in the upper part with pores in the upper or upper and lower cell-angles only, in the basal half and especially near the lateral margins with numerous ringed pores, which are sometimes arranged in interrupted rows on the commissures.

Chlorophyllose cells in section rectangular to trapezoid, free on both surfaces of the leaf, lumen large, oblong-oval, hyaline cells weakly convex on both sides.

Hab. Moorland pools.

Distrib. England; France; Belgium; Germany. Abbot's Moss, Cheshire (*Holt*); between Talsarnau and Maentwrog, Merionethsh. (*Jones & Horrell*); Blackroot Pool, Sutton Park, Warwick (*Bagnall*); Wimbledon Common, Surrey (*Mayes*); Trelleck Bog, Monmouth (*Ley*); Fixby, W. Yorkshire (*Hobkirk*); Canisp, Sutherland (*Dixon*); near Ightham, Kent (*Horrell*).

41. S. BATUMENSE Warnst. in Schrift. der Naturforsch. Gesellsch. in Danzig, N. F. Bd. ix. Heft 2, 1896, p. 160.

Plants very robust, with large capitula, forming low, greyish- or bluish-green tufts.

Stem-cortex in one layer.

Stem-leaves very large, ovate, up to 2·57 mm. long and 1·43 mm. wide, toothed or somewhat fimbriate on the roundish-truncate apex, margin more or less inrolled, border narrow and of equal width throughout. Hyaline cells generally fibrillose to the leaf-base and divided here and there by a cross-wall; pores numerous, small and bordered in the upper half on both surfaces, but somewhat more numerous on the outer surface and here interrupted by pseudopores and generally in rows on the commissures, towards the base of the leaf with pores in the upper or lower cell-angles only.

Fascicles with 4–5 branches; the 2 or 3 stronger spreading branches are as much as 27 mm. long and gradually taper at the apex, and have the leaves arranged uniformly all round; the others are appressed to the stem. *Branch-leaves* very large, oblong-ovate, up

to 4 mm. long and 2 mm. wide, toothed on the widely truncate apex, margin little or not at all inrolled, border narrow. Hyaline cells with numerous fibrils, on the inner surface in the upper half with small scattered pores in the cell-angles only, in the lower half much more numerous and in part arranged in rows on the commissures; on the outer surface towards the apex almost entirely without pores, only in the middle of the leaf towards the lateral margins with scattered small true pores, which are generally immediately opposite pores on the inner surface, or also with numerous pseudopores.

Chlorophyllose cells in section rectangular to barrel-shaped or also, in part, trapezoid and then with the longer parallel side on the outer surface; wall generally equally thickened all round, free on both surfaces, hyaline cells convex on both sides.

Hab. Moorland pools.

Distrib. Russia; Germany.

42. S. OBESUM Warnst. in Bot. Gaz. xv. 1890, 247.

Syn. *S. subsecundum* var. *turgidum* C. Mull. Syn. i. 1849, 101? *S. contortum* var. *obesum* Wils. Bryol. Brit. 1855, 22. *S. subsecundum* var. *obesum* Schimp, Syn. ed. ii. 1876, 844.

Exsicc. Braithw. Sphagn. Brit. Exsicc. 1877, No. 20 *b* (sub nom. *S. subsecundo* var. *auriculato* forma *immerso*).

Almost always completely submerged or floating, with frequently a plumose habit. Very robust and turgid, resembling large aquatic forms of *S. rufescens*. Frequently dark purple, less frequently green, or variegated.

Wood-cylinder generally dark brown.

Stem-cortex in a single layer.

Stem-leaves large to very large, lingulate, generally fibrillose throughout and with few pores.

Fascicles of 2–3 branches, all of which are generally spreading and similar, very robust and swollen from the very large leaves. *Branch-leaves* large, oval-oblong, with very few pores on each surface, or almost entirely non-porose; frequently with the hyaline cells more or less replaced by chlorophyllose cells of similar form; sometimes the pores are more numerous on the outer surface, but are then in the cell-angles only, and not in rows on the commissures.

Chlorophyllose cells in section rectangular, median and free on both surfaces.

Hab. Submerged or floating in moorland pools.

Distrib. Throughout Europe; N. America. Lindon Common, Mobberley, Cheshire (*Whitehead*).

43. S. PYLAIEI Brid. Bryol. Univ. i. 1826, 749.

Syn. *S. sedoides* Brid. *l. c.* 750.

Tufts loose, above blackish brown, brown below.

Wood-cylinder dark brown.

Stem-cortex in 1–2 layers.

Stem-leaves large, oval, very concave, resembling the branch-leaves in form and anatomical structure, generally entirely without

pores or in older leaves with resorption areas on the outer surface between the strongly developed fibrils.

Branches short and slender, or clavate, generally only one or two together and not forming fascicles; pendent branches wanting. *Branch-leaves* towards the apex of the branch closely imbricate, elsewhere loosely arranged, smaller than but otherwise resembling the stem-leaves; pores entirely absent on both surfaces.

Chlorophyllose cells in section rectangular, of the same height as the hyaline cells, free on both surfaces, wall equally thickened all round; lumen small, oval to triangular-oval, centric or nearer the inner surface. Capsule immersed, very small, almost spherical, when empty with wide mouth; stomata absent. Lid very wide, convex. Spores pale yellow.

Hab. Peat bogs and stagnant pools.

Distrib. France, very rare; N. America, common.

This very characteristic species should be looked for in this country; it more closely resembles a *Hypnum*, such as *H. sarmentosum*, than any species of its own genus.

(To be continued.)

BIBLIOGRAPHICAL NOTES.

XXIII.—Dupetit-Thouars.

Louis Marie Aubert Aubert Dupetit-Thouars, the celebrated and somewhat eccentric botanist, was born in the Château de Boumois, near Saumur, Nov. 5th, 1758.

He took to botany, he tells us ("Phytologie" [*infra*, No. 9], p. 133), in October, 1780, and in 1783 had sketched a "Flore des Environs de St. Malo," and had studied more particularly the plants of Anjou. He claims to have furnished notes to Merlet de la Boulaie for his "Herborisations" (*op. cit.* p. 134, note).

In 1787, when on garrison duty at Lille, he was invited to join a small scientific society called the "Collège des Philalèthes," and to this end wrote his first published pamphlet, the "Enchaînement des Êtres."

His brother Aristide, about 1790, endeavoured to equip an expedition in search of La Pérouse, but subscriptions sufficient to cover the cost not being received, the two brothers sold their patrimony and so raised funds. Their vessel was about to sail from Brest, when the Revolution broke out. Aubert was arrested by the revolutionaries on his way to the port, and Aristide only avoided a similar fate by putting out to sea, leaving word for his brother to join him at Mauritius. Aristide was, however, taken prisoner by the Portuguese at Fernando do Noronha and sent to Lisbon.

Aubert, on obtaining his release, sailed Oct. 2nd, 1792 ("Hist. Végét." [*infra*, No. 2], preface, p. viii. In the preface to the "Mélanges" [*infra*, No. 8], p. 12, he says Sept. 7th). The vessel was obliged to touch at Tristan da Cunha for water, and Aubert turned the five days spent there to good account in botanizing; fifteen days at the Cape were similarly utilized.

On May 2nd, 1793, he landed, penniless, in Mauritius, where he spent two years re-mapping the island and investigating its Flora. He then spent six months (July 1795–Jan. 1796) in Madagascar. His passage was booked for home, but he determined to visit Bourbon first. He, however, sent back to Jussieu the manuscript of his "Genera Nova Madagascariensia" [*infra*, No. 6].

In Bourbon he spent three and a half years in re-mapping the island and collecting its plants. After another year in Mauritius, which he employed in arranging his collections, he sailed for France, landing at Rochefort Sept. 2nd, 1802.

He arrived, with his herbarium and his manuscripts as his sole fortune, at Paris, where he obtained employment, though of what nature he does not state. Jussieu engaged him on the "Dictionnaire des Sciences Naturelles," and he wrote the article "Botanique," besides many minor ones, for the first six volumes (1804–6), when publication was suspended. In 1807 he was appointed Director of the Royal Nursery Grounds at Roule, with a salary of 3600 francs per annum, a post which he held till the abolition of the establishment in 1827, delivering annually a course of lectures on botany, which were but poorly attended—a fact of little wonder when the fragments of his lectures which survive are investigated.

He had returned from his travels full of his discoveries, which he evidently thought he had but to announce to command instant attention and fame. Needless to say he was bitterly disappointed, and he spent much time and energy in bewailing his fate. Even after he had been made an Academician, in 1820, he lamented the difficulty he met in getting his views accepted.

His character has been so ably summed up by Flourens in his "Éloge" (Mém. Acad. Sci. Paris, tom. xx.), that nothing further need be said here; but no satisfactory list of his numerous scrappy publications has hitherto appeared. The following list, with notes, of such as are not included in journals and indexed in the Royal Society's "Catalogue," may be of some service.

In its compilation I have to acknowledge very kind assistance from colleagues in the Printed Book Department, notably Mr. J. Macfarlane; from Mr. W. Botting Hemsley, as regards copies of works at Kew; and from other friends.

The letters between the number of pages and the size of the volume, in the various titles, indicate the London libraries in which copies occur: N = Natural History Museum; B = British Museum; K = Kew Gardens; R = Royal Society; ( ) = not as originally issued, but in one or other of the different gatherings.

1. "Dissertation sur l'Enchaînement des Êtres." *Pp. 48.* 8vo. *Lille*, 1788.

[Quérard: "La France Littéraire," tom i. p. 111.]

About 120 copies were printed and distributed. It was reprinted in the "Mélanges," &c., 1811 [infra, no. 8], where its history will be found in the "Discours préliminaire" to that collection [pp. 8–11].

2. "Plantes des îles de l'Afrique australe formant des genres nouveaux, ou perfectionnant les anciens; accompagnées de dissertations sur différens points de Botanique." 4to. *Paris*, 1804.
   ["Flora," 1822, Bd. i, Beil. i, p. 2].
   The title was afterwards altered to:
"Histoire des Végétaux recueillis sur les isles de France, La Réunion (Bourbon) et Madagascar," *&c.* Pt. i. *Pp. xvi, 40; 10 pls.* N, B, K. 4to. *Paris*, 1804.
   In this edition the plates are in outline.
—— [Another edition entitled] "Histoire des Végétaux recueillis dans les isles australes d'Afrique." Pt. i. *Pp. xvi, 64; pls. iii–xx, xxv–xxx.* K. 4to. *Paris*, 1805.
   A copy of this edition is preserved in the Library at the Royal Gardens, Kew. Pp. i–xvi and 1–24 are equivalent to pp. i–xvi and 15–38 of the 1804 edition. Plates XXV–XXX are shaded.
—— [Another edition: same title as last.] *Pp. xvi, 72; 24 pls.* N, B. 4to. *Paris*, 1806.
   This differs from the preceding in having additional pages, and in the plates being consecutively numbered and all shaded.
   The half-title reads: "Voyages dans les Isles australes d'Afrique. Partie Botanique."
   According to Miltitz (Bibl. Bot. col. 196) it was reissued in 1807 in four parts.

3. "Histoire particulière des Plantes Orchidées, recueillies sur les trois îles australes d'Afrique, de France, de Bourbon et de Madagascar." *Pp. vii, 32, 2 tabs.; 110 pls. col.* N, B, K, R. 8vo. *Paris*, [1804–] 1822.
   The half-title reads:—"Flore des Îles australes de l'Afrique. Famille des Orchidées." Stated in advertisements on the half-title of the Author's "Essais" (1809) [No. 7] to have been begun in 1804. Sixty-six plates had been completed in 1808 ("Mélanges" [No. 8]: Disc. prélim. p. 28), and seventy-five in 1815 ("Recueil de Rapp. Arbres fruitiers" [No. 10], advt.).

4. "Essais sur l'organisation des Plantes, considérée comme résultat du cours annuel de la Végétation." [*pp. 31.*] 8vo. *Paris*, 1805.
   ["Flora," loc. cit.] See note to No. 7.

5. "Notice historique sur le genre *Caniram*, ou *Strychnos* de Linnæus." *Pp. 14.* 8vo. *Strassbourg*, 1806.
   ["Flora," loc. cit. Miltitz: op. cit., col. 236. Pritzel: No. 2523.]

6. "Genera nova Madagascariensia," *&c.* *Pp. 29.* 8vo. [*Paris*, 1806.]
   Both Pritzel and Baillon ("Dict. Bot.") give the date of publication as 1806, a statement I am unable to prove or disprove. Flourens in his "Éloge" (Mém. Acad. Sci. Paris, tom. xx. 1849, p. xiii) puts it before the "Plantes" [No. 2], but this is evidently wrong. It is reviewed in

the "Göttingische gelehrte Anzeigen" for July, 1808 (p. 1144), and quoted as 1808 by Miltitz (*op. cit.*, col. 196), but this may have been a second issue. It was reprinted in J. J. Roemer's "Collectanea," 1809 (pp. 195–218), and in Dupetit-Thouars' "Mélanges" [No. 8] in 1811, with introductory "Observations sur les Genera nova Madagascariensia" (*4 pp.*), and the second sheet filled up with an "Index alphabeticus" and a "Prodromus Phytologicus Vegetabilia exhibens nuperrimè insulâ Madagascar detecta . . . Operâ et studio . . . F. Noronha" [*2 pp.*], which, we are further informed, was to have been printed in 1787 in the Île de France, if the author had not died.

7. "Essais sur la Végétation considérée dans le développement des Bourgeons," *&c.* *Pp. xii. 304; 2 pls.* N, B, K, R.
8vo. *Paris*, 1809.

The two first essays in this work were issued in 1805 [No. 4], and re-issued in 1806 ["Flora," loc. cit. Quérard, loc. cit. See also preface to the present work, p. vii.] Quérard errs considerably when he states that the whole were reproduced in the "Mélanges."

8. "Mélanges de Botanique et de Voyages . . . Premier recueil." N, B, K, R.
8vo. *Paris*, 1811.

This is composed of a "Discours préliminaire" [*pp. 32*]—the "Dissertation sur l'Enchaînement des Êtres" [No. 1, *pp. 48*]—the "Genera nova" [No. 7, *pp. 32*], noted above, preceded by some "Observations" [*pp. 4*]—"Observations sur les Plantes qui croissent dans les îles de France," *&c.*, which includes "Observations sur les trois premiers volumes du Dictionnaire de Botanique de M. Lamarck" [part of the "Encyclopédie méthodique"], with notes for future volumes [*pp. 80; 2 pls.*].—"Cours de Botanique," a fragment for a projected book on popular botany [*pp. 16.*]—"Description abrégée des Isles de Tristran d'Acugna," with an "Esquisse de la Flore de l'Isle de Tristran d'Acugna," both sample fragments submitted to the Institute [*pp. 48 (2): 15 pls., 1 map*].—"Treizième Essai. Notice historique sur la Nature et les fonctions de la Moelle et du Liber" [*pp. 48*], read before the Institute in 1810 and approved for printing, but never published by that body. It is here printed as a projected continuation of his "Essais" [No. 5].

9. "Phytologie, ou Tableau général de la Botanique." *Pp. 176 1 tab.; 1 pl.* N, R.
8vo. [*Paris*, 1811?].

This work, which is without title-page, is not quoted in any bibliography that I can find, though it appears in the advertisement of the Author's works in his "Histoire d'un Morceau de Bois" [No. 12] in 1815, and in his "Revue générale" [No. 14] in 1819, p. 9, where he speaks of the "Tableau Encyclopédique qui a servi d'ouverture à mon Cours en 1813"; and of the work says, "il pourroit être

publié sous peu de temps." It is also cited on the verso of some of the title-pages of the "Cours" in 1828 [No. 18]. It appeared after the "Mélanges," to which allusion is made on p. 112; and the folding table opposite p. 98, that bears date 1811, is the scheme of the author's lectures. Pp. 1–105 are a second edition of the Author's article "Botanique" in the "Dict. Sci. Nat." vol. v, 1805.
Pp. 106–110, printed in the same type, contain remarks on the cultivation of Plants, the foundation of the Royal Nursery Grounds, and the Author's appointment thereto. These were reprinted in No. 22.
The remainder, in a different type, comprises "Considérations sur ce Tableau," *&c.*, pp. 111–120.—"Plan d'une Histoire générale des Plantes, formée principalement de l'ouvrage de M. Adanson, intitulé *Familles des Plantes*," pp. 121–132. This last was submitted to the Institute in Aug. 1809.
The concluding portion, headed "Notice sur mes Travaux Botaniques," pp. 133–176, with a plate of Orchids, amounts to a recital of his futile efforts to prevail upon the Institute to accord the same value to his works as they had in his own eyes, and contains reprints of his papers as published in the "Analyse des Travaux . . . Partie Physique" in the Memoirs of the Institute.

10. "Recueil de Rapports et de Mémoires sur la culture des Arbres Fruitiers." *Pp. xii, 256; 8 pls.* B, R. 8vo. *Paris*, 1815.

[Continued as:]

11. "Le Verger Français, ou Traité général de la culture des Arbres Fruitiers . . . Second recueil . . contenant un mémoire sur les effets de la Gelée dans les Plantes." *Pp. xlviii, 84.* N, B. 8vo. *Paris*, 1817.

12. "Histoire d'un Morceau de Bois, précédée d'un Essai sur la Sève . . . et de plusieurs autres morceaux [reprinted from the 'Bulletin de la Société Philomathique'] tendant à confirmer la théorie de Physiologie végétale exposée dans les Essais sur la Végétation," *etc.* *Pp. xxxv, 192; 1 pl.* N, B, R. 8vo. *Paris*, 1815.

13. "Discours sur l'Enseignement de la Botanique, prononcé le 24 Mai 1814, &c." *Pp. 48.* N, K, R (B). 8vo. [*Paris*, 1819.]
The date of publication is given as 1814 in Pritzel and in the Kew Catalogue; but both the Kew copy of the work and that in the Natural History Museum have on p. 45 the following:—"Je me suis encore servi de ce Discours pour ouvrir ce Cours le 15 mai 1819, mais je l'ai terminé de la manière suivante." This fixes the date of these copies, and I can find no evidence that this discourse was printed before; had it been, I think the number of pages would have differed. Pp. 34–35 were reprinted in No. 22.
Possibly this was re-issued again in 1824 [see note to No. 21].

14. "Revue générale des matériaux de Botanique et autres," *&c.* *Pp. 10.* B, K. 8vo. *Paris*, 1819.
Cited in the "Bibliographie de la France" for 2 Jan. 1819.
It consists of a catalogue of his works published or to be published.

15. "Cours de Phytologie, ou de Botanique générale. Première séance. Introduction." (N) B, K (K) (R) (B). 8vo. *Paris*, 1819.
The copy in the Banksian Library [B. 158 (5)], which has the title-page, consists of—(i.) Introductory preface, pp. 5–8; (ii.) Portrait of Jung; (iii.) The "Cours," in the heading to which the word "Aitiologie," omitted from the title-page, occurs, with the "Tableau synoptique," which is the same as that published in the "Phytologie" [No. 9], but dated 1813.
The copy at Kew has in addition a secondary title-page, which reads:—"Second Cours. Application de la Phytologie aux Usages et à la Culture des Plantes en général, et en particulier à la Direction des Arbres fruitiers," *&c.*
I am inclined to regard this title-page as adventitious, and believe it must have belonged to some edition of No. 17.
The "Cours" (iii.) was also circulated either by itself or in company with the next.

16. ——"Seconde séance. Phytognomie." *Pp. 113.* N, K, R (B). 8vo. [*Paris*, 1820.]
[Bibliog. Fr. 5 Feb. 1820.]
Without title-page.
These last three [Nos. 14–16] were subsequently sent out together, and reviewed as one work under the title of the first. [*E. g.* Sprengel: "Neue Entdeck. Pflanzenk." Bd. ii. (1821) p. 337.] Nos. 15 and 16 were possibly re-issued in 1824, for they are reviewed under the title of No. 15, although the number of pages cited agrees with those in No. 16, in Férussac's "Bull. Sci. Nat." tom. i. (1824), p. 38.

17. "Cours de Phytologie, ou de Botanique générale appliquée à l'Art de Cultiver les Plantes," *&c.* *Pp. 32.* N, R (B). 8vo. [*Paris*, 1828.]
[Bibliog. Fr. 20 Sept. 1828.]
Without title-page.

18. "Cours de Phytologie, ou de Botanique générale divisé en vingt séances," *&c.* N, B, K. 8vo. *Paris*, 1828.
Under this collective title were re-issued several different collections of the preceding works, or fragments of works.
The most complete is probably the copy in the Printed Book Department of the British Museum [968. k. 20], which includes in the following order Nos. 17, 13, 15 (iii.) and 16, preceded by a small preface of *2 pp.* The Kew copy consists of this preface, with Nos. 17 and 13 only.
The copy reviewed in Férussac's "Bull. Sci. Nat." tom. xvii. (1829), p. 230, seems to have consisted of 17, 15, and 16;

whilst the copy in the Natural History Museum consists of 15 (iii.) and 16 only, with the addition of portraits of Jung and Brunfels.* The verso of the title-page being blank.

In the British Museum and Kew copies the verso of the title-page bears the following scheme, which is interesting as showing the author's own arrangement of his fragments.

"Recueil des Ouvrages publiés par l'auteur, qui concernent le Cours de Phytologie.

Annonce de ce Cours	1828.	2 feuilles.
TABLEAU GÉNÉRAL DE LA BOTANIQUE.		
C'est l'article Botanique du Dictionnaire des Sciences naturelles . .	1809.	11 feuilles.
Essais sur la Végétation	1809.	20 ,,
COURS DE PHYTOLOGIE.		
Introduction	1819.	1 ,,
Ire Séance. Discours sur l'Enseignement de la Botanique	1819.	3 ,,
IIe Séance. Phytognomie	1820.	7 ,,

Un vol. in 8vo de 44 feuilles."

19. "La Physiologie végétale devrait-elle être exclue du concours pour le prix fondé par M. de Monthion ?" *Pp. 24.*
8vo. *Paris*, 1822.
[Pritzel: No. 2534. La France Littéraire.] 120 copies only were issued.

20. "Sur la formation des Arbres," *&c.* *Pp. 16.* K.
8vo. *Paris*, 1824.
[Férussac's "Bull. Sci. Nat." tom. ii. (1824), p. 36. Pritzel gives the date as 1828: probably this was a re-issue.]

21. "Notice historique sur la Pépinière du Roi au Roule; faisant suite à un Discours sur l'Enseignement de la Botanique, prononcé . . . 1824." *Pp. 32.* N, K, R. 8vo. *Paris*, 1825.
Either the date of the "Discours" given in the title is a misprint for "1814," or No. 13 was delivered once again in 1824.

22. "Conclusions de deux discours qui ont servi d'ouverture au Cours de Phytologie," *&c.* *Pp. 33–64.* N.
8vo. [*Paris*, 1826.]
["Bibliog. Fr." 3 June, 1826, p. 493, where also the statement occurs that the title on the wrapper reads: "Suite de Notice historique," *&c.*]
Pp. 33–38 are a reprint of *pp. 106–110* of No. 9, and *pp. 39–56* of *pp. 34–45* of No. 13.

23. "Rapport sur un mémoire, contenant une Notice d'Anatomie végétale . . . par C. Romain," *&c.* *Pp. 64.* N, K.
8vo. [*Paris*, 1825.]

* This portrait is only in N and R.

["Bibliog. Fr." 26 Mar. 1825.]

C. Romain was Dupetit-Thouars' old antagonist, C. Romain Féburier. (Féburier's "Précis d'Anat. Vég." 1824, preface, reprinted on *pp. 51–2* of the above.)

24. "Éclaircissemens sur un Rapport fait à l'Académie Royale des Sciences." *Pp. 52.* 8vo. *Paris*, 1826.

["Bibliog. Fr." 10 June, 1826, and "France Litt." Not recorded elsewhere.]

25. [Anon.] "Examen de deux mémoires de Physiologie végétale, suivi de l'examen d'un passage d'un troisième mémoire publié à Genève, comme les deux autres, sous le titre de *Monographia generis Polygoni prodromus.*" *Pp. 32.* 8vo. *Paris*, 1827.

[Férussac's "Bull. Sci. Nat." tom. xiii. (1828), p. 66. Not recorded elsewhere.]

26. "Remarques lues à la Société Philomatique . . . 1816 sur une note relative au Cambium et au Liber, lue par M. Mirbel." *Pp. 20.* 8vo. *Paris*, 1828.

[Privately printed. Férussac's "Bull. Sci. Nat." tom. xv. (1828), p. 360. Not recorded elsewhere.]

27. "Explication sommaire de quelques figures destinées à faire voir jusqu'à quel point ces deux assertions sont vraies: L'Arithmétique de la Nature est toujours conforme à sa Géométrie. N. Grew . . . La Nature a plus de propension à employer le nombre cinq que tout autre. T. Brown . . . . (Extrait des Travaux académiques)." *Pp. 4.* N. 8vo. [*Paris*, 1828?]

Sixteen woodcuts, with explanatory text. There is an allusion to this as a "Mémoire" in Flourens' Éloge (op. cit. p. xxv).

I have come to the conclusion that these figures were prepared by Dupetit-Thouars to illustrate a paper read before the Academy of Sciences in 1828, an abstract of which, by Cuvier, was given in the "Analyse des Travaux"* for that year (Mém. Acad. Sci. Paris, tom. xi. 1832, pp. clix–clxii, and, in advance, in Férussac's "Bull. Sci. Nat." tom. xxi. 1830, pp. 422–425). That he hoped to induce the Academy to publish the illustrations is evident from his statement at the bottom of the title, "Extrait des Travaux académiques." They never did appear, his theories not being acceptable to the authorities of those days; but in one respect Time has brought revenge, as the following extract from the "Analyse" will show:—

"Ces observations intéressent particulièrement M. DuPetit-Thouars, parce qu'elles lui fournissent l'occasion de présenter sous un nouveau jour . . . cette proposition, que *la fleur n'est autre chose qu'une transformation de la*

* Probably a good many interesting observations by Dupetit-Thouars are buried in these annual summaries, the contents of which have not been indexed by the Royal Society.

feuille, proposition depuis long-temps exposée par Linnæus," *&c.*

Dupetit-Thouars also contributed articles to the first six volumes (first edition, 1804–6) of the "Dictionnaire des Sciences naturelles" and to the "Dictionnaire d'Agriculture pratique," &c., edited by Count François de Neufchâteau, the first edition of which appeared in 1833, and the second in 1836.

B. B. Woodward.

SHORT NOTES.

Fossombronia cristata Lindb.—Although there are few records for this hepatic in Britain, it will probably be found to be widely distributed. It is most generally confused with *F. pusilla* (L.). In West Inverness I have found it to be the commoner of the two species. I also have it from Staffordshire (*Rev. H. P. Reader*) and North-east Yorkshire (*Mr. Wm. Ingham*). This species can frequently be known at sight from *F. pusilla* by its smaller size and capitate terminal leaves; but examination of the spores, which ripen in autumn, is necessary in every case. It must be borne in mind that the two species are occasionally to be found growing together, as they have the same habitat—bare damp soil on footpaths, sides of ditches, and fallow fields; thus each gathering must be minutely examined to avoid a mixture. The most frequent mistake made with this genus lies in a sufficiently high microscope power not being used. Under a low power the spores of the various species appear much like each other. As the literature of our species is scattered, I add a key which may be of service until descriptions are given in Mr. Pearson's *Hepaticæ of the British Isles*:—

1.	Spores furnished with papillæ	2.
	Spores with crests	3.
2.	Papillæ 20–25 on face and end of spore . . .	*cæspitiformis.*
	Papillæ about 100 on face and end of spore . .	*Mittenii.*
3.	Crests in nearly parallel lines	4.
	Crests forming alveoli	5.
4.	Crests on face 15–24	*pusilla.*
	Crests on face 28–36	*cristata.*
5.	Margin of spores winged; alveoli 7–10 on face of spore	*angulosa.*
	Margin crenulate, not winged; alveoli at least 2–3 times as numerous	*Dumortieri.*

—Symers M. Macvicar.

Euphorbia Esula var. Pseudo-cyparissias in Berks.—I gathered specimens of this plant from one of two patches observed on the bank of the Thames between Wallingford and Cholsey on Aug. 21st. It appears to be new to the county.—Richard F. Towndrow.

NOTICES OF BOOKS.

Handbook of British Rubi. By William Moyle Rogers, F.L.S. London: Duckworth & Co. 8vo, cloth, pp. xiv, 111. Price 5s.

Thirty-one years ago Prof. Babington brought out his *British Rubi;* the *Fruticosi* section then numbered forty-one, of which two have disappeared, and four have been merged in other species, leaving thirty-five as a net remainder to compare with the one hundred that we find numbered in the *Handbook of British Rubi* by the Rev. W. Moyle Rogers. This volume presents a well-executed and up-to-date monograph of the genus *Rubus* for the British Isles; one hundred and seventy forms are described, as species, sub-species, or varieties, in an order and grouping which are set forth (pp. 2–30) in two Keys defining the groups and enumerating the species which fall to each, and in a Conspectus of Species which gives in brief the main points of specific distinction. In an Appendix the distribution is more exactly detailed; and a full Index of all the Latin names brings the book to a close. The half dozen English names are not entered here, but stand in the text; exception may be taken to the Dewberry being placed as a synonym of Blackberry (p. 2) instead of under *R. cæsius* L., to which it more strictly belongs.

It is not, however, only the numerical increase of forms that called for, first, an *Essay at a Key* by the same author, and now the present *Handbook.* Names had been freely imported from Germany in the past, and in some cases tacked on too hastily to English plants; and it has required years of patient investigation and toilsome correspondence with continental specialists to establish our present list on a sure foundation. In this labour Mr. Rogers has taken the principal part, and as a result he offers this *Handbook* (with needless diffidence) to his fellow-students; his main object throughout being to differentiate and define our various forms as briefly as seemed consistent with exactness. The descriptions are admirably in keeping with this intention—terse, definite, consistent—followed in each case by a reference to the published Set of British Rubi, the habitat, and distribution of the species; with a paragraph of remarks on the forms, affinities, and differences from the nearest allies. As the one hundred species with numerous subspecies and varieties are thus despatched in less than one hundred pages, the promise of brevity is well kept—sometimes, perhaps, too well.

Great as the work of defining the species and tracking out the synonymy must have been—a work for which a wide knowledge of the recent history of the genus was necessary, without which no writer on the subject could escape the numerous pitfalls that beset his path—still greater mental effort was required for the grouping of the various allied forms, and constructing the Keys and Conspectus, which introduce the fruticose section; since in this department it is evident that we have no mere copying of other men's schemes, but a judicious rearrangement, in which the claims of every species have been duly weighed. That a perfect scheme

has been formed, or one that will satisfy every batologist, it would be rash to affirm; for the cross-alliances and resemblances in the species and subordinate forms are so numerous, that, with a method of subdivision confessedly somewhat artificial, it is almost unavoidably a case of *quot homines, tot sententiæ*; and we have in Mr. Rogers's arrangement here and there an odd result; of which the wide separation of No. 23, *R. pulcherrimus* Neum., and No. 52, *R. cinerosus* Rogers, two closely allied if not confluent forms, is a case in point. The adoption of the intermediate rank of sub-species, though at sight perplexing, really simplifies; in this way some less clearly marked species take a lower grade under their nearest congener, and some varieties possessing more marked and constant characters are raised to a similar level.

The lucidity of the subject-matter is occasionally marred by the want of a like clearness in the arrangement of the type. The sub-divisions lettered *a*, *b*, *c* (pp. 43–45, *e. g.*) are throughout the book separated by a space only from what precedes, but are not spaced off from what follows; and when (as on p. 56) no less than three sub-divisions or grouplets follow one another immediately in as many lines, without any spacing and without variation in the type, the reader has not all the aid a more varied typography would afford to help him through the maze of analysis.

The Conspectus of Species is a valuable compendium, presenting in three or four lines apiece the pith of the specific descriptions. The heading of this Conspectus—in which, by the way, the species should have been numbered as in the body of the work, for ease of reference—is dignified with extra large capitals, as for a new chapter. Practically it is Key No. 3—a major key, perhaps, but a key of the same analytical character as the two preceding Keys of groups. However, the printing throughout the book is very creditably done; by way of exception, we notice in the generic account (p. 1) "petals 5—abnormally 5–10": even in this genus, bristling with knotty points as it does, we presume it cannot have any of its parts normally and abnormally of the same number. On p. 26 we are told of a panicle "with long, very strongly ascending branches and several 5-natel"; and we seem to have met with a new epithet in the last word, till it resolves itself into "5-nate l.," an abbreviation which a list of such translates into "leaves."

This list of Abbreviations and Explanations (p. xiv) might with advantage have been made more complete; for, however obvious the meaning of "incl." (p. 46) and "excl." (p. 106) and "gl." (pp. 45, 61) are, neither these nor perhaps the letters which stand for the points of the compass should have been omitted. Thus a confusion might have been averted; for on p. 99 a few fresh abbreviations are inserted, and the letters E., S., and W. set to represent England, Scotland, and Wales respectively, notwithstanding the fact that they usually stand for three of the cardinal points, and are so employed throughout this work. So (on p. 104) E. and W. signify both England and Wales and east and west. and S. stands for south, though the reader is directed to understand Scotland. With the Appendix, too (p. 99), we get at the sense of

the square brackets enclosing vice-comital numbers, which are there explained, but not before.

It need not be supposed that the *Rubi* can be easily mastered, even with the help of so excellent a guide as Mr. Rogers has supplied, any more than with the best manual on skating a beginner would at once cut figures or achieve the Dutch roll. In nature many of the types are befogged with untypical forms; the most constant vary under the opposite effects of light and shade. The stem is reddened by exposure to light; the leaves, which are of thicker texture and even rugose in sunny spots, become thin and flat and even less hairy beneath in shady woods and copses. This cause of variation borne in mind, the student will find the *Handbook* a very efficient guide; its faults lie on the surface, and are, as the papers say of minor Boer successes, regrettable incidents that will not affect the main issue. The volume before us is the fruit of long experience, matured judgment, and unremitting toil; we trust that it will be widely used, and thus lead to a more successful understanding of one of the most labyrinthine puzzles in British botany.

E. F. Linton.

Organography of Plants, especially of the Archegoniatæ and Spermaphyta. By Dr. K. Goebel. Authorized English Edition by I. B. Balfour, M.A., M.D., F.R.S. Part I.—General Organography. Royal 8vo, pp. xvi, 270; with 130 woodcuts. Oxford: Clarendon Press. 1900. Price 12s. 6d.

English students will welcome Professor Balfour's translation of Dr. Goebel's suggestive book on the Organography of Plants, whether or no all the interpretations and views therein contained are likely to meet with unqualified acceptance. If nothing else, the volume is a useful protest against a too mechanical system of morphology which has threatened to devitalize the science. In his introductory chapter, "Morphology and Organography," the author strikes the keynote of his work—namely, the important bearing of function on structure, and the necessity for a correlated study of the two. The title of his book is based, he tells us, on the idea expressed by Herbert Spencer, "whose work is far too little valued by botanists," as follows:—"Everywhere, structures in great measure determine functions; and everywhere functions are incessantly modifying structures. In nature the two are inseparable co-operators; and science can give no true interpretation of nature without keeping their co-operation constantly in view. An account of organic evolution, in its more special aspect, must be essentially an account of the inter-actions of structures and functions." The author condemns the sharp distinction which has been so often made between the organs of physiology and the members of morphology, an artificial and imperfect distinction which was of service for a time in emphasizing the close relation between the various parts of a plant and in giving definiteness to our idea of the plant-body, but which has been pushed too far, often leading to

"one-sidedness and empty theorizing." Goebel quotes as an outcome of this evil what he calls the "Differentiation Theory," that form of the doctrine of metamorphosis which has arisen from the study of the transformations of leaves, and which assumes that the manifold kinds—foliage-leaves, scale-leaves, bracts, sporophylls, &c.—have arisen from certain indifferent primordia at the vegetative apex. These variously functioning structures have one thing in common—they are leaves, "a leaf" being an abstraction with which nothing can be identified; each is the result of a hypothetical transformation of the abstract "leaf," according to the need of the plant. Goebel, on the other hand, contends that the primordium is not an indifferent structure, and any transformation that occurs —as *e.g.* scale-leaves from foliage-leaves—is *actual*, not hypothetical, and that this can be demonstrated by observation and experiment. The doctrine which he condemns could never have been developed if the less variable root, and not the protean leaf, had been the object of study.

"The idea that morphology has nothing to do with the function of organs has been acquired entirely because the fact has been overlooked that the transformations seen in organs are conditioned by a *change of function*. Their functions have been treated as subordinate in determining the characters of organs; external relations alone have been taken as the chief points for consideration. . . . . If we separate function from form, we are at once led into altogether unfruitful speculations."

These remarks preface the first section of the book, entitled "General differentiation of the plant-body"; they are followed by a discussion of the limitations which must be set on the use of the terms "phyllome," "caulome," and "trichome," especially the latter. The statement that all trichomes arise from the epidermis is often taken to imply that everything that arises out of the epidermis is a trichome. Remaining chapters deal with the progressive formation of organs and division of labour in the thallophytes, the process of regeneration, and a brief but lucid account of concrescence and arrest.

The second section, "Relationships of Symmetry" (pp. 65–138), deals with "the general relationships in space of the configuration of plants," both of the vegetative and floral organs. Dr. Arthur Weisse supplies a sketch of Schwendener's mechanical hypothesis of leaf-position (pp. 74–84), at Dr. Goebel's request, he himself holding "another view of the importance of the mechanical hypothesis of phyllotaxy and of its empirical groundwork, was therefore desirous to have the principles of it explained from the other side."

There is also an interesting account of anisophylly, or the occurrence of leaves of a different size and quality on the different sides of horizontally growing shoots. The phenomenon is intimately associated with the direction of incidence of light-rays; though light must not be regarded as the sole determining factor. In discussing the symmetry of flowers the author uses the terms "radial" and "dorsiventral" in preference to "regular" and "irregular," or "zygomorphic." Much work remains to be done on the causes of dorsiventrality of flowers and inflorescences; the fact that examples

occur in wind-pollinated flowers—*e. g.* grasses—excludes the action of insect visitors as a universal cause. Goebel suggests that the frequency of unilateral inflorescences in grasses may be related to their oscillation by the wind, but it is not easy to regard this as the determining or even as a very important factor.

A most fascinating subject, and full of possibilities, is that of the third section (pp. 142–174): "Differences in the formation of organs at different developmental stages. Juvenile forms." The juvenile form may or may not differ strikingly from the adult; the investigation of the numerous and varied types of difference and their causes is a wide field of research. The statement that in seed-plants "the cotyledons which so frequently differ in form from the foliage-leaves are merely arrested forms of these, the arrest being sometimes permanent, sometimes transient," is a far too sweeping assertion, and leaves unexplained a very large number of cases. This section consists chiefly of a useful account of a number of illustrative instances from different plant-groups.

"Malformations and their significance in organography" is the subject of section iv. (pp. 177–202), the smallest of the five. The conclusion of the matter is practically that their significance is very limited, and that we are almost completely in the dark as to their cause. The author favours Sachs' view that the differences in form of plant-organs are based on differences in nutritive material, a theory which would be most difficult to prove, though it may afford a useful working hypothesis.

The fifth and last section (pp. 205–270), deals with "the influence of correlation and external formative stimuli upon the configuration of plants." It is a chapter in experimental physiology from the organographical point of view, and consists mainly of the discussion of a number of cases illustrating the action of gravity, light, and environment on the position and form of plant-organs.

There is no index, but an extended list of contents is given at the beginning of the book. An index to the whole work will appear in the second "special" part, a translation of which will be issued when the author has finished it, a consummation much to be desired.

A. B. R.

A Glossary of Botanic Terms with their Derivation and Accent. By Benjamin Daydon Jackson. 8vo, cloth, pp. xi, 327. Price 6s. London: Duckworth & Co.

In this volume, Mr. Jackson has given us another of those results of plodding industry with which his name is associated—results varying in value from the indispensable *Index Kewensis* to the curious index of Kew publications on which we commented in this Journal for 1897 (pp. 100–103). His new production takes rank in the higher class; there was room for such a book, and Mr. Jackson has supplied what was wanting.

Mr. Jackson's preface is at once so informing and so modest, and his helpers are so numerous and so distinguished, that criticism, even if it were called for, might seem impertinent. Nor have we

anything serious in that direction to offer, and it would seem hardly worth while to point out such trivial slips as are inevitable in a book of this kind. What strikes one most is the extensiveness of the vocabulary of botany, and the very small proportion of it which is in actual use. Its extent, too, increases almost daily, and Mr. Jackson will soon have material for an enlarged edition; he will find some in Mr. Horrell's revision of *Sphagnum* now publishing in this Journal. We note, indeed, that the volume has an appendix of twenty-four pages of "additions during the printing of the preceding pages." The only quasi-popular term we miss is "slime-moulds," and with this we can dispense, as indeed we could with a good many which find a place. Among words of portentous length "necrocoleopterophilous" may claim a high position.

The Glossary is well printed, well bound, cheap, and useful—qualities which cannot fail to ensure for it a large circulation.

---

*ARTICLES IN JOURNALS.**

Bot. Centralblatt. (No. 36). — F. Brand, 'Der Formenkreis von *Glæocapsa alpina*' (concl.). — A. J. M. Garjeanne, 'Ueber ein monströses Köpfchen von *Bellis perennis*.' — (Nos. 37–39). G. Gillain, 'Zur Anatomie der Palmen- und Pandanaceen-Wurzeln' (1 pl.).

Bull. Soc. Bot. Belgique (xxxix, 3 : 29 Aug.). —C. van Bambeke, 'Monstruosité du *Boletus luteus*' (1 pl.).—J. Chalon, 'Herborisations à Banyuls, Pyrénées.'

Bull. Soc. Bot. France (xlvi, 8 : no date).—Ch. Flahault, 'H. L. de Vilmorin' (1843–1899; portr.).—M. Gandoger, 'Flore du Mont Kosciusko, Australie Méridionale.' — Id., 'Plantes nouvelles de l'Himalaya.' — D. Clos, 'Les tuberculoides des Légumineuses.'— L. Planchon, 'Polymorphisme des *Alternaria*.' — E. Boudier, Lucien Quelet (1832–1899). — E. Roze, 'L'Escluse et l'idée de la sexualité végétale.' — M. de Vilmorin, *Decaisnea Fargesii*. — E. A. Finet, 'Espèces nouvelles du *Calanthe*' (2 pl.).

Gardeners' Chronicle (22 Sept.). — W. R. Fisher, 'Physiological differences between the Sessile and Pedunculate Oaks.'

Journ. R. Microscopical Soc. (Aug.).—A. L. Smith, 'New Microscopic Fungi' (1 pl.).

Mem. de l'Herb. Boissier (20 Aug.). — P. Carbi, 'Les espèces du genre *Mathiola*.' — F. R. M. Wilson, 'Lichenes Kerguelenses.' — G. E. Post, 'Plantæ Postianæ.' — C. Meylam, 'Flore bryologique du Jura.'

Rhodora (Sept.).—M. L. Fernald, 'The Bilberries of New England.'

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* The dates assigned to the numbers are those which appear on their covers or title-pages, but it must not always be inferred that this is the actual date of publication.

BOOK-NOTES, NEWS, &c.

We have received a *Flora of Skipton* [West Yorkshire] *and District*, "compiled by Lister Rotheray, and published by subscription under the auspices of the Craven Naturalists' and Scientific Association, 1900." It is a well-printed pamphlet of 144 pages, and its completeness is noteworthy—the vascular and cellular cryptogams being fully enumerated, so that the list contains upwards of 2200 species and varieties. A map of the district, the extent of which is not stated, is given. Mr. Rotheray has been fortunate in having obtained the help of specialists; his own investigations of the district have extended over eleven years. There are no observations on any of the species, and no points for comment suggest themselves. The only drawback to the appearance of the book is in the printing of what are conventionally termed the "English names"; these glare out at the reader in thick black type, and embrace such curiosities as "Red Horn-of-Plenty-Lichen," "Koeler's Crested Grass," "Wood False Brome Grass," and the like.

In his *Botanizing*—"a guide to field-collecting and herbarium work" (Preston & Rounds Co., Providence, R.I., price 75 cents)—Prof. W. W. Bailey has given us, in small compass, all that we need know about the subject. After a brief introduction and a chapter on "equipment," we have an essay on collecting generally, followed by "directions for particular families," including the cryptogams. The herbarium next receives attention, and the book ends with chapters on museums, botanical gardens, and libraries, the last containing an exceedingly well-selected list of systematic books of reference. The book, moreover, is extremely well written, and every page gives evidence of practical knowledge, either from the author or from some good authority whom he has laid under contribution, or who has contributed special information. The printer has done his part well, and the result is an admirable little volume which is certain of a large circulation in America, and which many on this side the Atlantic will find suggestive and useful.

The most recent part of the *Icones Plantarum* contains several important items. The following new genera are established:—*Ranalisma* Stapf (Alismaceæ); *Allospondias* Stapf (Anacardiaceæ); *Botrypleuron* Hemsley (Scrophulariaceæ)—the last for four species formerly placed in *Calorhabdos*. Mr. Hemsley also describes, among other novelties, a new *Castilloa* (*C. Tunu*), a new *Pandanus* (*P. Cominsii*) from the Solomon Islands, and a Chinese *Cydonia* (*C. cathayensis*) of which "a more detailed history will appear in the *Kew Bulletin*." From this we gather that it is intended to resuscitate the *Bulletin*, which has been in abeyance for twelve months. Other novelties are described by members of the Kew staff, the labours of the Director being devoted exclusively to the editing of the work. Some of the plants figured are somewhat lacking in special interest—*e. g.* some of the new oaks, the figure of one of which (*Quercus Edithæ*) is extremely poor.

Another *Handbook of Plant Collecting* comes to us from Messrs. J. & R. Parlane, Paisley. It is the work of Mr. J. M. B. Taylor, Curator of the Free Museum, Paisley, and is published at the modest price of 6d. net. It contains many useful suggestions, but is marred by the author's unfortunate literary style, which is irritating to the reader. Much of his limited space is taken up with useless or unnecessary remarks, often conveyed in inflated language. Thus we are told that "Botany, in a nut-shell, is that science which takes a comprehensive view of all plants that cover the surface of the earth from the minutest lichen moss or alga, only visible by the aid of the microscope, to the most gigantic productions of the tropics; while it alike takes notice of the common weeds by the roadside. Association with plants is very close. These lines, common in use in the fourteenth century in the struggle between rich and poor, remind us of its antiquity, viz.:—

'When Adam delved and Eve span,
Who was then a gentleman?'

This association with plants began to form the science we call Botany." The book is further disfigured by the crudest illustrations which we have ever seen: it is inadequate to say that their absence would improve the book. Nevertheless the little work contains much that is useful, and if Mr. Taylor will submit it to a friend with a blue pencil, it will be greatly improved in a second edition.

We have received the first part of what seems likely to be an important contribution to French botany—a "Flore descriptive et illustrée de la France de la Corse et des Contrées limitrophes," by the Abbé H. Coste. From the prefatory remarks on the cover, we gather that it is intended to replace Grenier and Godron's admirable work, which has long been out of print, and is moreover half a century old. The special feature of the present work is a small but well-executed original figure of every species described, in the style of those in the illustrated edition of Bentham's *Handbook*. The present fascicle contains 311 descriptions and figures, and brings the enumeration down to *Iberis*. The work is to be completed in nine parts, forming three volumes, which will not be sold separately, and can only be obtained by subscribers; it will cost sixty francs when complete, but until the completion of the first volume may be had for forty-five francs paid in advance to the publisher, M. Paul Klincksieck, 3, Rue Corneille, Paris. The completion of the work in three years is guaranteed. We reserve a more detailed notice until the Flora has farther advanced; meanwhile we warmly commend it to the notice of British botanists. We note, however, that the author claims to belong to "l'école linnéenne et classique, et en conséquence n'admet que les espèces de premier ordre pourvues des caractères constants et faciles à saisir. Les espèces de deuxième ordre et les principales variétés sont cependant mentionnées, mais non figurées." The absence of bibliographical citations and of synonymy is to be regretted, but the inclusion of these would be foreign to the plan of the book.

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SENIOR ASSISTANT, DEPARTMENT OF BOTANY, BRITISH MUSEUM (NATURAL HISTORY)

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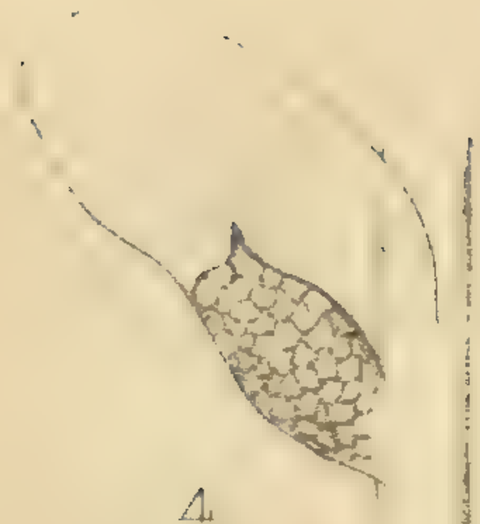

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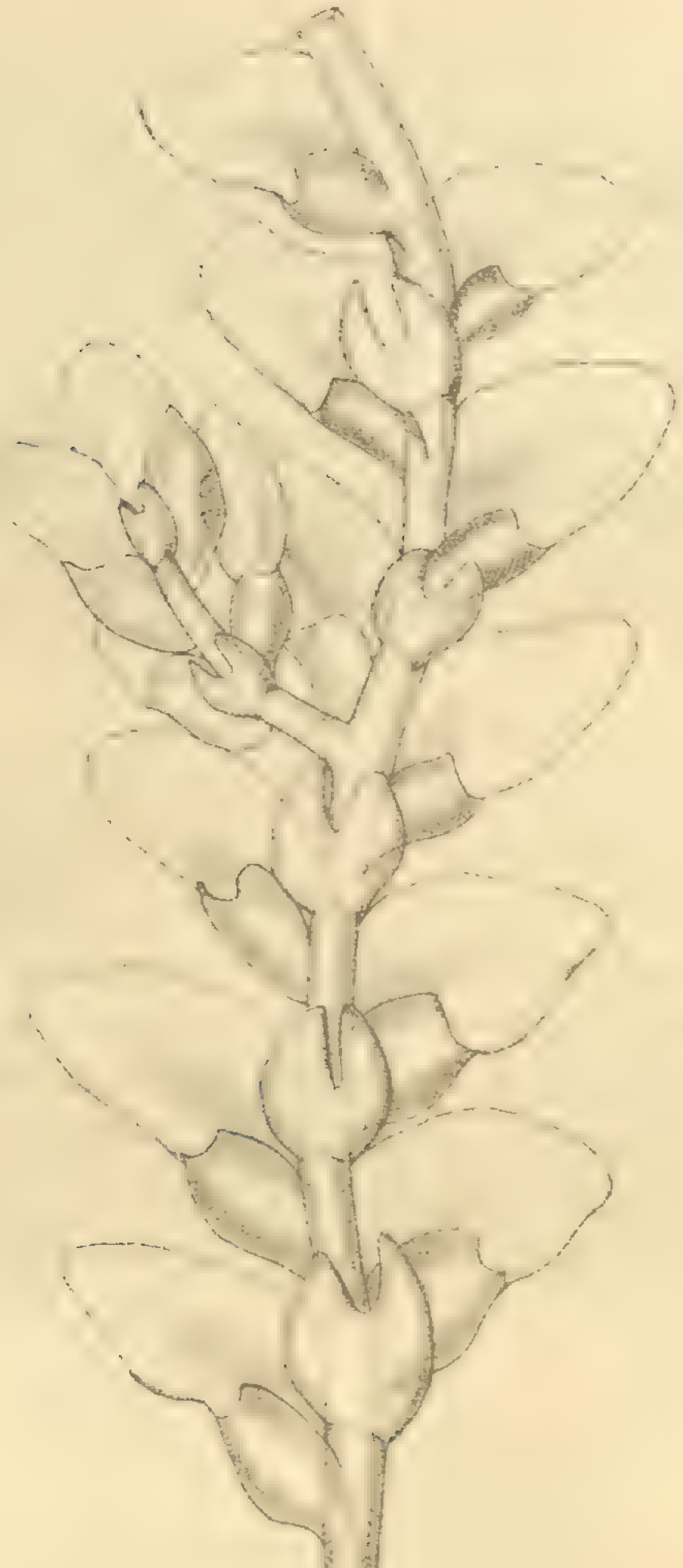

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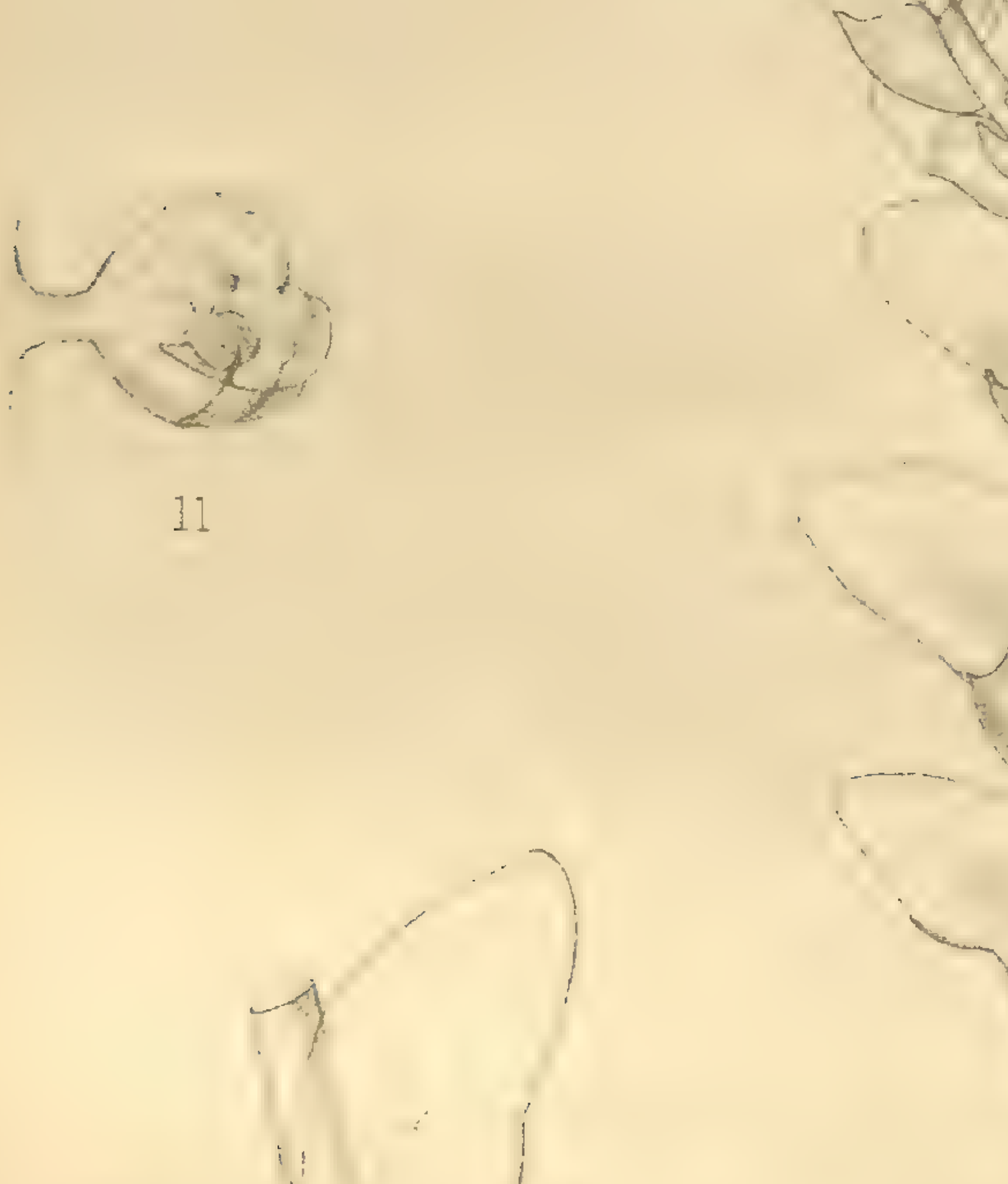

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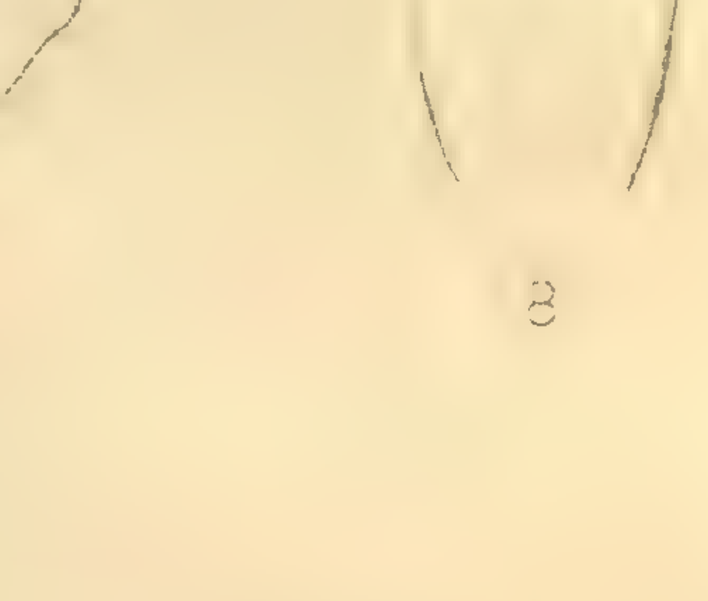

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Lejeunea Macvicari Pears

LEJEUNEA MACVICARI Pearson, sp. n.

(Plate 415.)

Monoicous; loosely cæspitose or creeping upon mosses; minute; pale yellowish green in colour. Stems slightly and irregularly branched. Leaves alternate, approximate or dissitous, patent to erecto-patent (50°–30°), oblong-oval, slightly concave, apex obtuse or obtusate, rarely subacute; lobule half to a third smaller, oval or cylindrical, ventricose, free angle sometimes notched; texture lax; cells small, 4-, 5-, and 6-angled, walls firm, no trigones or thickened angles. Stipules somewhat similar in size to the lobules, broadly oval, bifid to the middle or slightly more, sinus very narrow, segments acute. Female flowers terminal on short branches. Bracts oval, lobule about half the size, oblong, apex obtuse. Bracteole oblong, bifid to about a third, sinus narrow, segments acute. Perianth projecting about half beyond the bracts, oval-orbicular to orbicular-pyriform, *ecarinate*. Calyptra delicate, obovate. Capsule globose, dark brown. Androecia produced from side of main stem, globose, two pairs of perigonial bracts; antheridia single, oval.

Dimensions. Stems $\frac{1}{4}$ in. long, ·04 mm. diam., with leaves ·5 mm. wide; leaves ·3 mm. to ·35 mm. × ·15 mm., lobule ·15 mm. × ·75 mm.; cells ·02 mm.; stipules ·125 mm. × ·1 mm., segments ·05 mm., ·15 mm. × ·125 mm., seg. ·075 mm., ·175 mm. × ·15 mm., seg. ·075 mm.; bract ·3 mm. × ·175 mm., lobule ·175 mm. × ·05 mm.; bracteole ·275 mm. × ·15 mm., seg. ·075 mm.; perianth ·6 mm. × ·4 mm., ·5 mm. × ·3 mm.; calyptra ·3 mm. × ·225 mm.; capsule ·175 mm. diam.; androecia ·175 mm. × ·175 mm.

Habitat. Creeping amongst mosses and other hepatics, Allt-a-Mhuillin, Kinlochmoidart, West Inverness, 22/4/1898. On old elm stem in ravine, Allt Allan, Moidart, West Inverness, 4/5/99, *S. M. Macvicar, Esq.*

Obs. This is a very distinct *Lejeunea*, and distinguished at once from any of the European species by its perfectly smooth perianth; it can also be easily recognized from any of them by the shape of the leaves; these in outline somewhat approach those of *Lejeunea diversiloba* Spruce, but in that species the lobule varies in a remarkable manner, and the texture is rigid, the stems especially so. *L. ulicina* Tayl. is dioicous. *L. minutissima* (Smith) has lobule almost as large as the leaf, and the perianth is 5-angled.

None of the North American or other species of this genus are like it, as far as I have been able to find out.

I have submitted specimens to Herr F. Stephani, who writes: "The *Eu-lejeunea Macvicari* is certainly a very good species, the perianth not being plicate."

I have great pleasure in naming it after Mr. Macvicar, the discoverer of it, who has made more important additions to our knowledge of the distribution of the British Hepaticæ than any other botanist for many years.

DESCRIPTION OF PLATE 415. — Fig. 1. Plant, natural size. 2. Portion of stem, postical view, × 64. 3. Ditto, antical view, × 85. 4. Leaf with lobule, postical view, × 85. 5. Portion of leaf, × 290. 6. Stipule × 85. 7. Bract, × 85. 8. Bracteole, × 85. 9. Perianth, with bracts and bracteole, × 64. 10. Cross-section of perianth, × 24. 11. Androecia, × 85 (Kinlochmoidart, *S. M. Macvicar, Esq.*).

SUTHERLANDSHIRE MOSSES.

By WILLIAM EDWARD NICHOLSON.

THE following list of Sutherlandshire mosses is compiled from observations made between the 6th and the 24th July, 1899. From the 6th to the 17th July the district was explored by Mr. H. N. Dixon, who traversed the country from Lairg to Altnaharra, whence Ben Clibreck and Ben Hope were ascended, then went on by Tongue and Erriboll to Durness, exploring from this centre Smoo Cave, Cape Wrath and the Far-out Head, and, travelling south, was joined at Inchnadamph on the 17th July by Mr. E. S. Salmon and myself.

There was no reason to regret the selection of Inchnadamph as the principal centre for investigating the moss-flora of Sutherlandshire. An outcrop of limestone near the head of Loch Assynt, close to Inchnadamph, extends for some considerable way to the west and south, for the most part comparatively low down, and reaching a maximum elevation of about 2000 ft. in the Breabag Valley, about six or seven miles to the south-west of Inchnadamph, and it was on this limestone that the most interesting plants were found.

The higher mountains in the district were not very productive. Ben More Assynt (3273 ft.) and Coinnemheall (3234 ft.) are capped for some distance with quartzite, and their summits present a wilderness of stones, almost devoid of any vegetation, the only productive parts of them being a bed of stiff reddish clay overlying the quartzite between the two peaks, and for which it was impossible to find any origin in the existing rocks. Quinag (2653 ft.), most of which is composed of very hard conglomerate rocks, was scarcely more productive, though *Glyphomitrium Daviesii* managed to maintain a precarious existence there.

Owing to this fact, the moss-flora of the district, notwithstanding its high latitude, is very poor in northern or arctic species as compared with the higher parts of the Grampians; indeed, some of the better species which thrive near Inchnadamph —e.g. *Tortula princeps* and *Weisia calcarea*—are characteristic of southern rather than northern latitudes.

A list compiled in so short a time is of necessity very incomplete, but a sufficient number of species, several of them of interest, were observed to make the list worth publishing, if only as an encouragement to others who may be tempted to investigate more fully so promising a district.

The numbers refer to the vice-counties, 107 being East Sutherland, which is separated from West Sutherland (108) by the line of the watershed, which is so traced as to divide the south-eastern

portion of the county from that draining to the west and north. The spelling of the names is that adopted by the Ordnance Survey, which to southern ears often seems to bear but little relation to their pronunciation. The abbreviation "Inch." has been used for Inchnadamph in the list.

Sphagnum cymbifolium Ehrh. 107 & 108.—*S. papillosum* Ldb. 108. Not uncommon near Inch.—Var. *confertum*. 108. Inch.—*S. rigidum* Schp. var. *compactum* Schp. 108. Not uncommon.—*S. molle* Sull. var. *Müllerí* Braith. 108. Bog at the foot of Quinag, *c. fr.*—*S. tenellum* Ehrh. 108. Near Inch.—*S. subsecundum* Nees. 107 & 108. Fairly typical, but with the ochreous tint generally associated with *S. laricinum*. Near Inch. A very robust form with long terete branches occurred in springs on Canisp, which Mr. E. C. Horrell referred to *S. crassicladum* Warnst., distinguished from the other species of the *subsecundum* group by having the pores very much more numerous on the inner than on the outer surface of both branch-leaves and stem-leaves, and this identification has subsequently been confirmed by Warnstorf himself. Another remarkable form was found on wet sandy ground by a loch below Glas Bheinn, with very few solitary branches, and the stem-leaves like the branch-leaves, but larger, orbicular, concave, and obtuse. The form seems parallel to the var. *cyclophyllum* Ldb. of *laricinum*, but the cortical cells of the stem are in one layer only.—Var. *obesum* Schp. Inch. — *S. squarrosum* Pers. 107 & 108.—*S. acutifolium* Ehrh. Common and very variable in both divisions. — Var. *rubellum* Russ. 108. Loch-na-Meide, Altnaharra; Glen Dubh, Inch., where a form of this var. also occurred in deep tufts, bright green above and brilliant pink below. — Var. *quinquefarium* Ldb. 108. At the foot of Quinag; a short-stemmed form of this variety. — Var. *patulum* Schp. 108. Ben Hope; wood by Loch Assynt. — Var. *læte-virens* Braith. 108. Ben Hope. A form also occurred on Glas Bheinn with large oblong widely-pointed stem-leaves, fibrose and porose for two-thirds of their length; cells lax, the border narrow and not greatly enlarged at the base, which possibly belongs to the var. *polycladum* Cardot.—*S. Girgensohnii* Russ. 108. Ben Clibreck; a very marked rigid form with ascending branches.—*S. intermedium* Hoffm. Common in both divisions. — *S. cuspidatum* Ehrh. 108. Inch. — Var. *plumosum* N. & H. 108. Pools in a bog below Quinag.

Andreæa petrophila Ehrh. 108. Common on rocks, *c. fr.* A form was gathered near the summit of Quinag with the habit of the var. *alpestris* Thed., but having the cells papillose. — *A. alpina* Sm. 108. Canisp and Quinag, *c. fr.*—*A. Rothii* W. & M. 108.

Tetraphis pellucida Hedw. 108.

Catharinea undulata W. & M. 107 & 108, *c. fr.*

Oligotrichum incurvum Ldb. 108. Loose skrees on Ben More Assynt, *c. fr.*

Polytrichum aloides Hedw. 108.—*P. urnigerum* L. 107 & 108. — *P. alpinum* L. 108. — *P. piliferum* Schreb. 107 & 108. — *P. juniperinum* Willd. 108.—*P. strictum** Banks. 108. Ben Hope. —*P. formosum* Hedw. 108.—*P. commune* L. 107 & 108.

Diphyscium foliosum Mohr. 108. Ben More Assynt and Quinag; both specimens sterile.

Ditrichum homomallum Hpe. Common in both divisions, *c. fr.*—*D. flexicaule* Hpe. Common on limestone in 108. — Var. *densum* Braith. 108. Glen Dubh.

Swartzia montana Ldb. 108. Common, *c. fr.*—*S. inclinata* Ehrh. 108. Cliffs by Smoo Cave, Durness. Growing with it was a smaller compact form parallel to the var. *brevifolia* B. & S. of *S. montana*, which, although occasionally approaching the type, was on the whole well marked.

Seligeria Doniana C. M. 108. Limestone rocks, Allt-nan-Uamh, *c. fr.* — *S. pusilla* B. & S. 108. Sandstone rocks near Inch.—*S. recurvata* B. & S. 108. Wet rocks in Glen Dubh, *c. fr.*

Ceratodon purpureus Brid. Common in both divisions, *c. fr.*

Rhabdoweisia denticulata B. & S. 108. Earth-covered rocks on Quinag, *c. fr.*

Cynodontium polycarpum Schp. 108. Boulders in a stream at Altnaharra.

Dichodontium pellucidum Schp. Common in both divisions, *c. fr.* A tall form, in habit very like *D. flavescens*, but with a striate peristome, was gathered by the stream in Glen Dubh. This plant had abundant gemmæ, which generally seem more characteristic of the shorter-leaved form. A form near the var. *compactum* Schp. occurred on the Far-out Head.—*D. flavescens* Ldb. 108. Glen Dubh.

Dicranella heteromalla Schp. In both divisions, *c. fr.* A form near to, if not identical with, the var. *elata* Ferg. occurred on Canisp. —*D. secunda* Ldb. 108. Sandy ditches near Inch. *c. fr.*—*D. varia* Schp. 108. — *D. squarrosa* Schp. Common. 107. Near Lairg. *c. fr.* 108.

Blindia acuta B. & S. 107 & 108. Common and fruiting well in places.

Dicranoweisia crispula Ldb. 108. Crags on Ben Hope, *c. fr.*

Campylopus Schimperi Milde. 108. Glen Dubh, Inch. — *C. Schwarzii* Schp. 108. Fairly common. — *C. flexuosus* Brid. 108. Loch-na-Meide, a straight dark form with abundant fruit, near Inch.—*C. pyriformis* Brid. 108. Not uncommon, *c. fr.*—*C. fragilis* B. & S. 108. Glen Dubh, Inch.; a fine tall form. — *C. atrovirens* De Not. Common in both divisions. — Var. *falcatus* Braith. 108. Near Inch. — Var. *epilosus* Braith. 108. Ben Clibreck and near Inch., common; often very marked, but specimens occur with short hair points.—*C. brevipilus* B. & S. 108. (*Prof. Barker.*)

Dicranodontium longirostre B. & S. 108. Ben Hope. — Var. *alpinum* Schp. 108. Peaty ground near Inch.

Dicranum fulvellum Sm. 108. Glas Bheinn and conglomerate rocks of Quinag, poor and with scanty fruit. — *D. falcatum* Hedw. 108. Common on Ben More Assynt, *c. fr.* Growing with the type was a form with short cells as in *Cynodontium polycarpum*, possibly a condition induced by the very wet ground in which it was growing. — *D. Starkei* W. & M. 108. Ben More Assynt, *c. fr.*—*D. Bonjeani* De Not. 107 & 108.—*D. scoparium* Hedw. 107 & 108. — Var. *paludosum* Schp. 108. Glen Dubh; wet ground, with the

leaves slightly undulate when moist. — Var. *orthophyllum*. 108. Boulders in a wood on Ben Hope. — *D. majus* Turn. 108. Wood by Loch Assynt, &c. — *D. fuscescens* Turn. 108. Common; with abundant fruit in the wood by Loch Assynt.—*D. Scottianum* Turn. 108. Shaded rocks in the wood by Loch Assynt, with abundant fruit. — *D. uncinatum* C. M. 107. Ben Clibreck, a small form. 108. Glen Dubh, very fine; also in the wood by Loch Assynt and other places. — *D. asperulum* C. M. 108. Growing with *D. uncinatum*, as is usually the case, in all the localities of the former.

Leucobryum glaucum Schp. 107 & 108.

Fissidens bryoides Hedw. 108. — *F. osmundoides* Hedw. 108. Wood by Loch Assynt.— *F. adiantoides* Hedw. 108.— *F. decipiens* De Not. 108.—*F. taxifolius* Hedw. 108.

Grimmia apocarpa W. & M. 107 & 108.—Var. *rivularis* W. & M. 108. Rocky beds of torrents, Inch., *c. fr.* Robust and well marked. — *G. maritima* Turn. 108. Rocks by the sea, common, *c. fr.*— *G. funalis* Schp. 108. Glas Bheinn and Quinag. — *G. torquata* Hornsch. 108. — *G. pulvinata* Sm. Both divisions, *c. fr.* — *G. trichophylla*. 108. A robust form was gathered on rocks by Loch Assynt. — *G. decipiens* Ldb. 108. Stones of a bridge at Scourie, with good and abundant fruit. — *G. Hartmani* Schp. 108. Glas Bheinn; rocks by Loch Assynt, the latter very fine. — *G. patens* B. & S. 108. Ben Clibreck, *c. fr.* Glen Dubh, with faint traces of a hyaline point to the leaves. — *G. Doniana* Sm. 108. Not common. Conglomerate rocks on Quinag, *c. fr.* — A small barren tuft of another species of *Grimmia* unlike any described European species was gathered in 108, near Inch., on a detached block of limestone. The species most closely resembling it is the American *G. calyptrata* Hook.; but it has good leaf-characters to distinguish it from this, and appears to be a new and distinct species.

Rhacomitrium ellipticum B. & S. 108. Quinag, *c. fr.*—*R. aciculare* Brid. 107. Common. 108. Common, *c. fr.*, Altnaharra, on alder roots and twigs. A very remarkable form was gathered submerged in a stream at an altitude of about 2500 ft. on Ben More Assynt, with elongate stems and distant squarrose-recurved leaves.—*R. protensum* Braun. 107 & 108. A black rigid form with broad-pointed leaves was gathered on wet rocks at the base of Quinag. — *R. fasciculare* Brid. In both divisions, *c. fr.* — *R. heterostichum* Brid. Abundant in both divisions, *c. fr.* — Var. *alopecurum* Hub. 108.—Var. *gracilescens* B. & S. 108.—*R. lanuginosum* Brid. 107 & 108. — Forma *epilosa*. 108. Hollow on Ben More Assynt where snow had recently lain. Many of the stems had the leaves quite devoid of hair points. — *R. canescens* Brid. Common in both divisions, *c. fr.*—Forma *epilosa*. 108. Ben Clibreck, in the sand of a stream, with abundant fruit.

Ptychomitrium polyphyllum Fürnr. 108. Walls, *c. fr.*

Glyphomitrium Daviesii Brid. 108. Boulder by the road near Scourie, *c. fr.* Conglomerate rocks, Quinag, *c. fr.*, poor.

Hedwigia ciliata Ehrh. 108. Common on rocks, *c. fr.* — Var. *striata* Wils. 108. Rocks by the stream and tarn on Glas Bheinn, *c. fr.*; a well-marked form of the var.

Tortula muralis Hedw. Walls in both divisions, *c. fr.*—*T. subulata* Hedw. In both divisions, *c. fr.*—*T. ruraliformis* Dixon. 108. Sandhills near Durness. — *T. princeps* De Not. 108. Limestone crags to the south of Inch.; in immense rounded cushions, with abundant fruit. The leaves were less interrupted than is often the case, probably owing to the very dense habit.

Barbula rubella Mitt. In both divisions, *c. fr.* — Var. *ruberrima* Braith. 108. Ben Uidhe, Inch. — *B. tophacea* Mitt. 108. — *B. fallax* Hedw. var. *brevifolia* Schultz. 108. Alt-nan-Uamh. — *B. recurvifolia* Schp. 108. On the limestone near Inch. — *B. spadicea* Mitt. 108. Sandy detritus by the stream in Glen Dubh, *c. fr.* — *B. rigidula* Mitt. Walls in both divisions, *c. fr.*, and with the characteristic gemmæ. — *B. cylindrica* Schp. 108. Inch., not common. — *B. revoluta* Brid. 107 & 108. — *B. convoluta* Hedw. 107 & 108.—*B. unguiculata* Hedw. 108.

Leptodontium flexifolium Hpe. 108. Dry peaty ground on Breabag.—*L. recurvifolium* Ldb. 108. Moist rocks by waterfalls, poor. Ben Uidhe and Coinnemheall.

Weisia microstoma C. M. 108. Limestone rocks near Inch., *c. fr.* — *W. calcarea* C. M. 108. Shallow limestone caves in Glen Dubh; a fine form, in deep tufts, and not fragile. — *W. rupestris* C. M. 108.—*W. currirostris* C. M. 108. A remarkably robust and apparently undescribed form occurred on stones by waterfalls and rapids in Glen Dubh.—*W. verticillata* Brid. 108. Limestone rocks, Inch.

Trichostomum crispulum Bruch. 108. Limestone rocks, Inch.; a robust broad-leaved form. A form with narrower less cucullate leaves occurred in Glen Dubh.—*T. mutabile* Bruch. 108. Not uncommon. — Var. *littorale* Dixon. 108. Altnaharra; crags near Allt-na-Caillich, at an altitude of 1000 ft. on Ben Hope, a well-marked form with small short leaves. Growing with it was a more robust form with larger leaves, but referable to the var. *littorale* rather than to the type. — *T. tenuirostre* Ldb. 108. Wet rocks on Quinag and Ben Uidhe. — *T. inclinatum* Dixon. 108. Limestone rocks south of Inch. Some of the tufts are well characterized, but others are much less so, and approach *T. tortuosum* through the var. *fragilifolium*. The plants gathered tend to confirm the view of Boulay, that when growing under favourable conditions *T. inclinatum* is easy to recognize and well-characterized, but under less favourable conditions it appears to connect itself with several allied species.—*T. tortuosum* Dixon. 108. Very common on the limestone at Inch., fruiting sparingly.—Var. *fragilifolium* Dixon. Smoo Cave, Durness.

Cinclidotus fontinaloides P. B. 108. Common by streams, *c. fr.*

Encalypta ciliata Hoffm. 108. Loose earth in Glen Dubh, *c. fr.* —*E. streptocarpa* Hedw. 108. On the limestone.

Anœctangium compactum Schwg. 108.

Zygodon Mougeotii B. & S. 108. Quinag.—*Z. viridissimus* R. Br. 108. Trees and walls, sparingly.

Ulota Drummondii Brid. 107. Birches near Lairg, *c. fr.* The numerous stomata in several rows appear to be of some value in

separating this moss from *U. Bruchii*. The capsule also matures considerably later than that of *U. Bruchii*. 108. Altnaharra, on alders by a stream, fine and abundant; trees by Loch Assynt and Glen Dubh, *c. fr.*—*U. Bruchii* Hornsch. Common in both divisions with the last, *c. fr.* — *U. crispa* Brid. In both divisions with *U. Bruchii*, but not so common. — Var. *intermedia* Dixon. 108.—*U. phyllantha* Brid. Abundant on trees and rocks in both divisions, especially near the coast. — *U. Hutchinsiæ* Hamm. 108. Scourie, abundant, *c. fr.*; Inch., *c. fr.*

Orthotrichum rupestre Schleich. 107. The Crask near Altnaharra, *c. fr.*; a form with the leaf-cells markedly bistratose above, but the capsule not distinctly of the *Sturmii* character; processes well developed. 108. Loch-na-Meide, Altnaharra, and rocks by Loch Assynt, robust forms, *c. fr.*—*O. anomalum* Hedw. 107. Stone Bridge, near Altnaharra, *c. fr.*; capsules with the intermediate striæ fairly well marked. — Var. *saxatile* Milde. In both divisions, *c. fr.*—*O. cupulatum* Hoffm. In both divisions, *c. fr.* — Var. *nudum* Braith. 108. By the stream in Glen Dubh, with the type, and passing into it. — *O. leiocarpum* B. & S. In both divisions, *c. fr.*—*O. Lyellii* H. & T. 107. Lairg.—*O. affine* Schrad. 107. Wall near Lairg, *c. fr.*; stone parapet of a bridge on the Crask. A tall robust form with the calyptra often white, smooth, and membranous. 108. Walls and trees, not common. — *O. stramineum* Hornsch. In both divisions, widely distributed, but not very fine, *c. fr.*—*O. pulchellum* Sm. 107. Lairg, abundant on bricks and also on a stone wall near the hotel, *c. fr.* 108. Inch., *c. fr.*—*O. diaphanum* Schrad. 108. Inch., on elders, *c. fr.*

Splachnum sphæricum L. fil. 107. Moor near Lairg, *c. fr.* 108. **Sporadic throughout the district.**

Tetraplodon mnioides B. & S. 108. Glas Bheinn and Ben More Assynt, *c, fr.* — *T. angustatus* B. & S. 108. Glas Bheinn, a single tuft with male flowers only.

Funaria ericetorum Dixon. 108.—*F. hygrometrica* Sibth. 108.

Amblyodon dealbatus P. B. Calcareous spring at Durness; limestone rocks, **Inch.**, *c. fr.*

Aulacomnium palustre B. & S. 107 & 108. — *A. androgynum* Schwgr. 107. Lairg, a tall robust form. 108.

Conostomum boreale Sw. 108. Near the summit of Ben More Assynt, very poor and sterile.

Bartramia ithyphylla Brid. 108. Rocks, fairly common, *c. fr.* Very fine on Quinag. — *B. pomiformis* Hedw. In both divisions, *c. fr.*

Philonotis fontana Brid. Abundant in both divisions, *c. fr.*—Var. *pumila* Dixon. 108. Ben Clibreck, *c. fr.* and male.—*P. adpressa* Ferg. 108. Fairly common and well marked, especially near the heads of springs, with fruit on Coinnemheall. — *P. seriata* Mitt. 108. Abundant on Coinnemheall.—*P. calcarea* Schp. 108. On the limestone.

Breutelia arcuata Schp. In both divisions not uncommon. Fruit rare, on the limestone near Inch.

Leptobryum pyriforme Wils. 108.

Webera polymorpha Schp. 108. Ben More Assynt, *c. fr.*— *W. acuminata* Schp. 108. Ben Clibreck. — *W. elongata* Schwgr. 108. Quinag, *c. fr.* — *W. nutans* Hedw. In both divisions, *c. fr.* A form which may be the var. *cæspitosa* occurred by the rocky side of a stream at Altnaharra; also another with long rigid innovations as in *W. annotina*.—Var. *longiseta* B. & S. 108. In a peat cutting, Loch-na-Meide, *c. fr.* — *W. annotina* Schwgr. 108. Sand and boulders in a stream near Altnaharra; a remarkable form with large hollow bulbils, which very probably belongs to *W. bulbifera* Warnst. — *W. Ludwigii* Schp. 107. Ben Clibreck. 108. Ben More Assynt, *c. fr.* — Var. *elata* Schp. 108. A robust form 3–4 in. tall, with the leaves hardly so wide as is usual with var. *latifolia* and more strongly toothed, but referable to the var. rather than to the type, occurred on Canisp and Ben More Assynt. — *W. commutata* Schp. 108. Ben Clibreck and Glen Dubh, *c. fr.* A laxly tufted form with bulbils in the axils of the leaves on the barren stems, and much resembling *W. annotina* in general appearance.— *W. carnea* Schp. 108. — *W. albicans* Schp. 108. Damp sandy ground, not common.

Plagiobryum Zierii Ldb. 108. Ben Hope.

Bryum filiforme Dicks. Not uncommon in both divisions; with immature fruit on wet sandy ground near Inch. — *B. pendulum* Schp. 108. Limestone crags below Inch., *c. fr.* — *B. inclinatum* Bland. 108. Not common, *c. fr.* — *B. pallens* Sw. By streams in both divisions, common, *c. fr.*, with the cilia of the inner peristome often imperfect. — *B. Duvalii* Voit. 108. Marshy ground near the heads of springs on Coinnemheall, fine and abundant. — *B. pseudotriquetrum* Schwg. In both divisions abundant, *c. fr.* A form with a rather short capsule was gathered in Glen Dubh.—*B. intermedium* Brid. In both divisions, *c. fr.*—*B. cæspiticium* L. In both divisions, *c. fr.* — *B. capillare* L. Common in both divisions, *c. fr.* A synoicous form was gathered on a wall near Lairg. The capsule, however, is not of the *torquescens* form, nor are the leaves, which are but little twisted when dry, and denticulate above. — Var *Ferchelii* B. & S. 108. Limestone caves, Allt-nan-Uamh, and boulders in Glen Dubh. — *B. erythrocarpum* Schwgr. 108. Peaty ground, Quinag, *c. fr.*; some of the capsules with very short necks. —*B. alpinum* Huds. 107. Ben Clibreck. 108. Common; a compact slender form with small leaves was gathered on Canisp; Kylesku, *c. fr.* — *B. Mühlenbeckii* B. & S. 108. Protruding rocks in streams, Glas Bheinn and Coinnemheall. The form from Glas Bheinn is very dark, almost blackish. The Coinnemheall plant is more typical. It was almost invariably associated with a form of *B. pseudotriquetrum* with short almost borderless leaves, which closely resembled it in a moist state. The resemblance disappeared on drying. — *B. Mildeanum* Jur. 108. Sandy *débris* and rocks by streams; very fine on Coinnemheall.

Mnium affine var. *elatum*. 108.—*M. rostratum* Schrad. 108.—*M. undulatum* L. In both divisions. — *M. hornum* L. In both divisions, *c. fr.* A form with the leaves homomallous on Ben Hope.

— *M. serratum* Schrad. 108. Glen Dubh and Breabag, *c. fr.*— *M. orthorhynchum* B. & S. 108. Limestone rocks, Allt-nan-Uamh. The male plant, and barren ; in large wide tufts intermixed with a little fruiting *M. serratum*.—*M. punctatum* L. 108. Inch., a small-leaved form with somewhat the habit of a *Cinclidium*.—Var. *elatum* Schp. 108. Marshy ground on Coinnemheall, principally the male plant.

Cinclidium stygium Sw. 108. Wet peaty ground at the head of Loch Maol-a-Choire, abundant and fruiting well in places.

Fontinalis antipyretica L. 108. Streams, common. — Var. *gracilis* Schp. 108. Springs at 2000 ft. on Canisp. A rigid form, hardly collapsing when dry. — *F. squamosa* L. 108. Rocks in a stream on Quinag.

Neckera crispa Hedw. 108.—*N. complanata* Hübn. 108.

Pterygophyllum lucens Brid. 108. A remarkable form was gathered on Canisp growing in springs with *Sphagnum*, &c., in tall dense masses of a deep green colour, with erect crowded stems.

Leucodon sciuroides Schwgr. 108.

Pterogonium gracile Sw. 108. Rocks by Loch Assynt.

Antitrichia curtipendula Brid. 108.

Porotrichum alopecurum Mitt. 108.

Anomodon viticulosus H. & T. 108. Limestone rocks, Inch.

Pterigynandrum filiforme Hedw. 103. Rocks by Loch Assynt,

Heterocladium heteropterum B. & S. 108. Rocks in the wood by Loch Assynt; a delicate form, but hardly the var. *fallax*. — *H. catenulata* B. & S. 108. Limestone rocks at Breabag and Allt-nan-Uamh, fairly common. Growing with it was a paler form, softer than the type, with longer more tapering and more denticulate leaves, with longer cells. At first sight this plant appears very distinct, and might be taken for the var. *filamentosa* Boul. of *P. atro-virens*. Intermediates, however, between it and the type were present. It appears to be the same as *Leskea Vaucheri* Schp. MS., which was reduced by Wilson to a var. of *catenulata*.

Thuidium tamariscinum B. & S. 107 & 108. — *T. delicatulum* Mitt. Wet rocks on Quinag, Ben Uidhe, and by Loch Assynt. The Quinag plant poor, and with the colour of *T. recognitum* ; that from Loch Assynt very characteristic and well developed. — *T. recognitum* Ldb. 108. Limestone rocks, Inch.

Climacium dendroides W. & M. 108. Not uncommon, but poor.

Cylindrothecium concinnum Schp. 108. On the limestone near Inch.

Orthothecium rufescens B. & S. 108. Principally on the limestone, fruiting sparingly in very damp places.—*O. intricatum* B. & S. 108. Clefts of rocks on the limestone.

Isothecium myurum Brid. 108.

Pleuropus sericeus Dixon. 108. Not uncommon. A slender form occurred at Cape Wrath resembling at first sight *H. cupressiforme* var. *resupinatum*, with which it was growing.

Camptothecium lutescens B. & S. 108. Common on the limestone. A tall fine pinnate form occurred on the Far-out Head.

Brachythecium glareosum B. & S. 108. — *B. albicans* B. & S.

107 & 108. — *B. salebrosum* B. & S. var. *palustre* Schp. 107. — *B. rutabulum* B. & S. 108. — *B. rivulare* B. & S. Abundant on rocks in streams in both divisions.—Var. *chrysophyllum* Spr. 108. Rocks by the streams in Glen Dubh and elsewhere. Most of the specimens, in fact, approached this form. — *B. plumosum* B. & S. 108. —*B. purum* Dixon. 108. Common.

Hyocomium flagellare B. & S. 107. Rocks by a stream. 108. Quinag.

Eurhynchium crassinervium B. & S. 108. Limestone rocks, Glen Dubh; a robust form. — *E. prælongum*. 108. — Var. *Stokesii*. 108.—*E. Swartzii* Hook. 108.—Var. *rigidum*. 108. Limestone caves, Glen Dubh; not very well marked, but with erect rigid branches and the leaves striate when dry, and not complanate. The plant bears some resemblance to a small form of *E. striatum*. — *E. abbreviatum* Schp. 108. —*E. tenellum* Milde. 108.—*E. myosuroides* Schp. In both divisions. A robust prostrate form without the dendroid habit of the type was gathered among rocks on Ben Clibreck. This form, which somewhat resembles a *Brachythecium* in habit, has also been found on Quinag Hill, Skye, and is certainly deserving of a varietal name.—*E. striatum* B. & S. 108.—*E. rusciforme* Milde. 108. Common in streams, *c. fr.* — Var. *prolixum* Turn. (non Brid.). 108. In a waterfall on Quinag, a marked variety with slender julaceous brown branches.

Plagiothecium Müllerianum. 108. Rock-crevices on Ben Clibreck and Ben Uidhe, poor and scanty. It seems probable that this species will be found to have a wide distribution in Scotland, where suitable conditions occur. — *P. Borrerianum* Spr. 108. Mostly in rock-crevices, fairly common. — *P. pulchellum* B. & S. 108. Widely distributed, but not very common, *c. fr.* — Var. *nitidulum* Husn. 108. Ben Uidhe, *c. fr.* — *P. striatellum* Ldb. 108. An erect densely-tufted form under rocks on Coinnemheall. —*P. denticulatum* B. & S. 108. A form which grew in tall robust bright green tufts, paler below, was common by springs and rivulets on Canisp and Quinag. The leaves are large, tapering to an almost acuminate point, and usually markedly denticulate at the apex, very decurrent, with long double nerves reaching nearly half the length of the leaf, and with large cells. The leaf-margin is also slightly recurved.—*P. undulatum* B. & S. 107 & 108.

Amblystegium Sprucei B. & S. 108. Limestone caves at Alltnan-Uamh. — *A. serpens* B. & S. 108. Common, but not so universal as in the south. — Var. *depauperatum* Boul. Smoo Cave, Durness. — *A. filicinum* De Not. 108. Common and variable.— Var. *trichodes* Steudel. 108. Rocks in the wood by Loch Assynt. Very slender and delicate. Limpricht distinguishes this var. from *gracilescens* Schp. chiefly by the comparative absence of rhizoids. A form having leaves with an excurrent nerve, but not otherwise like the var. *vallisclausæ* Dixon, occurred in Glen Dubh. — *A. compactum* Aust. 108. Limestone caves, Smoo Cave, Durness, Glen Dubh, and Breabag. Two forms occurred in Smoo Cave, which, however, intergraded; one more compact and tufted, and the other

a slender creeping form with more distant spreading leaves with wider cells. The latter form emitted numerous rootlets from the stem and leaves (*v.* Journ. Bot. May, 1900).

Hypnum stellatum Schreb. 108. Marshy ground, common; fruiting sparingly near Inch.—Var. *protensum* B. & S. 108. Breabag.—*H. fluitans* L. In both divisions. A variety was gathered in a ditch by a peat moor on high ground between Loch Erriboll and Tongue with wide soft leaves closely resembling the var. *pseudostramineum* C. Müll., and only differing from it in the longer leaf-points, narrower at the apex, and a denticulate margin. — *H. exannulatum* Gümb. In both divisions. — Var. *brachydictyon* forma *orthophylla* Ren. 108. A slender straight-leaved green form referable to this var. was gathered at 2500 ft. on Ben More Assynt.—*H. uncinatum* Hedw. In both divisions common, *c. fr.*—*H. revolvens* Sw. In both divisions common and variable; fruiting sparingly near Inch. — *H. intermedium* Ldb. 108. A very variable plant occurred in wet places on the limestone near Inch., sometimes slender and sometimes very robust, with every intermediate. The leaves were often faintly striate, especially in the more slender forms. — *H. commutatum* Hedw. 108. Abundant, especially near springs on the limestone, *c. fr.* — *H. falcatum* Brid. 108. Common and variable. A delicate form occurred at Allt-nan-Uamh, approaching the var. *gracilescens* Schp. — *H. cupressiforme* L. var. *resupinatum*. In both divisions. — Var. *minus* Wils. 108. Cape Wrath.—Var. *ericetorum* B. & S. 108.—Var. *elatum*. 108. Sandhills, Far-out Head and Smoo Cave, Durness. — *H. hamulosum* B. & S. 108. Quinag. — *H. callichroum* Brid. 108. Glen Dubh and Quinag, *c. fr.* A curious erect form was growing with *Webera Ludwigii* on Ben More Assynt. — *H. mollusrum* Hedw. In both divisions. — *H. crista-castrensis* L. 108. Not uncommon; fruiting sparingly in the wood by Loch Assynt. — *H. palustre* L. 108.—Var. *hamulosum*. 108. Glen Dubh. — *H. eugyrium* Schp. 108. Rocks by Loch Assynt.—*H. ochraceum* Turn. 108. Stones by and in streams, common. — Var. *flaccidum* Milde. 108. Stream on Quinag; well-marked *flaccidum* with the leaves only slightly secund at the apices of the branches.—*H. scorpioides* L. 107. In pools by the road between Lairg and Altnaharra, *c. fr.* 108. Common.—*H. stramineum* Dicks. 108. Coinnemheall, a dense mountain form. — *H. trifarium* W. & M. 108. By a stream on Glas Bheinn. — *H. giganteum* Schp. 108. Ditch near Inch., abundant. — *H. sarmentosum* Wahl. 108. Common and variable; with fruit on Glas Bheinn. A form was gathered on Quinag growing in bright green tufts, with slender erect stems and the general appearance of *H. stramineum*, which, from Limpricht's description, would appear to be the var. *fallaciosum* Milde. A dark, almost black form also occurred on Quinag.—*H. cuspidatum* L. Common in both divisions. —*H. Schreberi* Willd. Abundant in both divisions.

Hylocomium splendens B. & S. In both divisions. A very slender form of this not very variable plant was gathered on Breabag.—*H. umbratum* B. & S. 108. Ben Clibreck and Ben More Assynt,

poor; rather finer in the wood by Loch Assynt. — *H. brevirostre* B. & S. 108. Ben Hope, a tall erect form. — *H. loreum* B. & S. In both divisions. — *H. squarrosum* B. & S. Abundant in both divisions.—*H. triquetrum* B. & S. In both divisions.

LEPIDIUM HETEROPHYLLUM Bentham.

By Frederick Townsend, M.A., F.L.S.

An examination of specimens, in the Herbaria of Kew and the British Museum, of the genus *Lepidium*, and especially of *L. heterophyllum* Benth., *L. Smithii* Hook., and of the var. *alatostyla*, led me to enquire how the dehiscence of the silicules of the latter is effected. None of the specimens were sufficiently advanced to show this satisfactorily, so at the commencement of the month of September in the present year I visited the original station at Redbridge, near Southampton, where I found the plant so far advanced that even decay had already commenced; but not one out of the 550 silicules I examined had dehisced, though they were ripe and perfectly formed, and contained perfect seeds. The question arises—Is this indehiscent character constant? I can hardly imagine it to be otherwise, though it might be premature to assert it definitely without the observation of more than one season.

In the normal forms of *L. Smithii* dehiscence commences at the base of the notch where the valves join the replum. The faint marginal nerve of the wing extends to its summit, and then turns downwards along the notch where it joins the replum and separates from it, in dehiscence, adhering to the cast-off valve. In the silicules of var. *alatostyla* the wing itself together with its marginal nerve is prolonged, extends upwards, and appears to merge into and adhere to the style in a manner which seems to hinder or preclude dehiscence. If the character be constant, it would be sufficient, independent of the remarkable subacuminate character of the wings of the silicules, to constitute a marked form or variety, and to militate against its being merged into Bentham's typical *L. heterophyllum*, as proposed by Mr. N. E. Brown in Eng. Bot. Suppl. part i. p. 27; but on other grounds I do not see that Mr. Brown's suggested alteration of nomenclature would be satisfactory. In reality he proposes a new and opposing character for Bentham's *L. heterophyllum*—viz. "Fruit without a notch at the apex," and a new character for the var. *canescens* of Gren. & Godr.—viz. "Fruit notched at the apex." I thus designate Mr. Brown's characters because they are neither to be found in the descriptions of Bentham nor of Gren. & Godr. Bentham's original description is in Cat. des Pl. Indigènes des Pyrénées et du bas Languedoc, par G. Bentham, 1826, p. 95:—"*L.* siliculis ellipticis, alatis, vix emarginatis, glabris; stylo exserto filiformi; caulibus diffusis, basi ramosis, apice ascendentibus, simplicibus; foliis caulinis, sagittatis, dentatis, glabris." Grenier and Godron also describe the silicules

thus:—"Ailes des silicules arrondies au sommet ou faiblement échancrées." A careful examination of authentic specimens in the Kew Herbarium shows that many of the silicules are really notched. There are two sheets of specimens with the following label:—"Lepidium heterophyllum Benth. In superiori vallis Eynes parte à la Bagouta prope torrentem. Pyr. or. Unio itiner. Endress. ad finem Junii 1830." I find, even on the same specimen, silicules some of which are truncate or rounded or slightly notched. One specimen is immature, but the silicules are apparently similar. I also find the silicules notched on specimens with the following label in Bentham's own handwriting:—"86. Lepidium heterophyllum. M. Areasque près les Eaux Bonnes. 5.8.39." The left hand plant of specimens gathered in the Vallée d'Eynes, 24–26, 6, 25, is the only plant which, though immature, has silicules similar to the Redbridge plant.

Thus Mr. Brown's character—"Fruit without a notch at the apex"—would exclude from the *L. heterophyllum* of Bentham several specimens gathered and named by Bentham himself. Grenier and Godron found the distinction between their *α heterophyllum* and their *β canescens* on the character of the leaves only, and they do not allude to any silicule-character except in their specific description. Their *α pyrenaicum* nob. is described thus—"Plante verte, à feuilles presque glabres"; their *β canescens* nob.—"Plante d'un vert blanchâtre, feuilles très velus." = *Lepidium Smithii* Hook. Thus, if Mr. Brown's nomenclature were adopted, confusion would be created, as var. *alatostyla* would come under his typical *L. heterophyllum*, whereas it comes under the *β canescens* of Gren. & Godr.

I feel a diffidence in suggesting a nomenclature and arrangement which would be most suitable. If we accept subspecies, both *L. heterophyllum* Benth. and *L. Smithii* Hook. have, I think, a claim to be considered subspecies of *L. campestre* L.; any way, in consideration of the marked difference in character and of the different areas of distribution, distinct and equal rank should be conceded to them, and the var. *alatostyla* should be retained as a var. of *L. Smithii* Hook., or be dropped altogether, and the specific character of the latter altered so as to express the variable form of the wing of the silicule. This variability is perhaps better shown in specimens from "Beach near Lydd, Kent," quoted by Mr. Brown as similar to the Redbridge plant, and by other specimens in the herbarium of the British Museum from "Hedge-bank near Hayes, Kent." I have carefully examined the Lydd specimens ex herb. J. S. Mill, and find the silicules are mostly emarginate, though some are truncate or rounded, while one of the Hayes specimens collected by Mr. James Groves has similar silicules, some of which are slightly emarginate and some rounded at the apex.

THE EUROPEAN SPHAGNACEÆ
(after Warnstorf)

By E. Charles Horrell, F.L.S.

(Continued from p. 392.)

§ viii. Sphagna cymbifolia Schimp.

Branch-leaves of medium size to large, ovate or roundish- to oblong-obovate, boat-shaped, with small teeth on the scarcely bordered lateral margins; apex wide, rounded and cucullate, never toothed, frequently with a hyaline border; the margin generally widely inrolled at the apex and for some distance down the leaf; when dry never undulate, and frequently with a slight lustre. Chlorophyllose cells in section broadly equilateral- or narrowly isosceles-triangular or narrowly rectangular to barrel-shaped, generally free on the inner surface of the leaf, more rarely free on both surfaces of the leaf or completely enclosed by the hyaline cells; hyaline cells, on the inner wall where united to the chlorophyllose cells smooth, papillose, with so-called comb-fibrils or with 2–3 longitudinal and almost parallel fibrils; pore-formation various, on the inner side generally with the pores chiefly near the lateral margins, on the outer side generally with very numerous pores in rows on the commissures, usually with large membrane-gaps in the upper cell-angles near the apex. Stem-cortex in several (to 5) layers of very wide, thin-walled cells, always with one or more (to 9) large pores on the outer wall of the superficial layer; generally fibrillose, more rarely quite without fibrils. Cortical cells of the branches not forming retort-cells, but, especially in the pendent branches, always with fibrils and pores. Stem-leaves sometimes rather small, sometimes large, sometimes very large, in most cases lingulate to spatulate, either with hyaline border all round or only at the broadly rounded apex; frequently the margin inrolled in the upper part; non-fibrillose or with fibrils more or less developed, sometimes fibrillose and porose to the base. Colour whitish, green, brown, or purple.

This very distinct section comprises about forty-two species, of which all the seven European species are found in this country. Most of the members of this group are at once recognized as belonging to the section by their robust size, and by the cucullate apex of the branch-leaves.

44. S. imbricatum (Hornsch.) Russ. Beitr. zur Kenntn. der Torfm. 1865, 21.

Syn. *S. Austini* Sulliv. apud Aust. Musci Appal. 1870, 3. *S. affine* Ren. & Card. in Rev. Bryol. 1885, 4.

Exsicc. Braithwaite, Sphagn. Brit. Exsicc. Nos. 1 & 2 (1877).

Plants in looser or more compact tufts, 7–15 cm. high, light to rather dark green, grey-green, yellowish, brown to deep brown; generally more delicate than the other European species of the

section, but sometimes occurring in stately, robust forms, resembling in habit *S. centrale* and *S. cymbifolium*.

Stem sometimes thin, sometimes more robust, generally of a dark colour. Cortex of 3–4, rarely 5 layers. Superficial cells the smallest; inner cortical cells with very numerous fibrils which are very close together. Superficial cells generally with few fibrils, and with 1–7, generally 2–5 pores.

Fascicles generally of four branches, which, with the exception of those of the capitulum, have the leaves in most cases loosely arranged and spreading; sometimes the leaves are squarrose, more rarely closely imbricated. Branches generally of medium length, very rarely brachy- or macro-cladous, eury-, dasy-, kata-, homalo-, ano-, to ortho-cladous, frequently oxycladous, sometimes relatively very thin and fine (leptocladous). Cortical cells of the branches with numerous fibrils; cross-walls not bent downwards as in *S. portoricense*, but sometimes curved or slightly oblique.

Branch-leaves ovate to broadly ovate, near the apex of the branches narrowly ovate, 1·6 (1·4–2·5) mm. long; at the apex markedly cucullate, and with the lateral margins more or less inrolled. Generally only having a border near the apex, or border absent; the leaves of the pendent branches with a broader border. Fibrils generally numerous, and pores in the upper half of the leaf numerous. Comb-fibrils present in very varying degrees of development; sometimes very numerous; sometimes only developed near the leaf-base, and sometimes altogether wanting. Pores on the inner surface in the upper half of the leaf few, generally only a single large round pore in the apical part of each hyaline cell, sometimes, however, 1–5 in each cell. In the lower part of the leaf, near the lateral margins, pores more numerous, and frequently in rows on the commissures. On the outer surface in the apical half of the leaf with numerous round or oval pores, which become less numerous towards the base. The leaves of the pendent branches have on both sides more pores than have those of the spreading branches.

Chlorophyllose cells in section equilateral or shortly isosceles-triangular to parallel-trapezoid, generally enclosed on the inner surface by the hyaline cells, which are, however, not united together for any appreciable distance, or only here and there for a short distance. Not rarely, and especially near the apex of the leaf, the chlorophyllose cells are free on the inner surface, and are then trapezoid.

Stem-leaves lingulate-spatulate, generally much smaller than the branch-leaves, 1·2 mm. (·8 to 1·8) long, sometimes wider, sometimes narrower, with a broad hyaline border all round, and especially at the apex; generally non-fibrillose or with few delicate fibrils in the upper half, sometimes, however, with numerous to very numerous fibrils and pores. Hyaline cells in the entire or in nearly the entire leaf septate, frequently with two or three cross-walls.

Dioicous; perichætial bracts somewhat secund, in the upper one-third closely fimbriate all round, non-fibrillose, with irregular

membrane-gaps. Capsule dark brown. Spores rusty red. Male inflorescence on the somewhat inflated apex of the comal branches.

Hab. On wet elevated heaths and in peat bogs.

Distrib. Scandinavia, Russia, Denmark, Germany, Belgium, France, Scotland, England; Asia; N. America; S. America.

This very distinct species is not primarily characterized by the presence of the peculiar comb-fibrils, in some forms these being entirely absent, but by the form and position of the chlorophyllose cells of the branch-leaves, by the stem-leaves, and the very numerous fibrils in the cortical cells of the stems and branches.

There are three main varieties :—

(1) Var. *cristatum* Warnst. in Hedwigia, 1889, pp. 367–372. Comb-fibrils numerous throughout the lower half of the branch-leaves. Lyth Moss, Westmoreland (*Barnes* in Braithw. Sphagn. Brit. Exsicc. No. 1, 1877. A form intermediate between var. *cristatum* and var. *sublæve*); Strath Garve, Ross (*Braithwaite*); between Stornoway and Garynahine, Lewis, Hebrides (*Smith*); Raplock Moss, New Galloway, Kirkcudbright (*McAndrew*); Witherslack Moss, Westmoreland (*Barnes*); Latheron, Caithness (*Lillie*); Lochan-na-Lairge, Perthshire (*Cocks*); Meall-nan-Tarmachan, Perthshire (*Cocks*).

(2) Var. *sublæve* Warnst. *l. c.* Comb-fibrils only slightly developed, frequently with only slender beginnings of fibrils near the leaf-base.

(3) Var. *affine* Warnst. in Bot. Gaz. 1890, 250. Syn. *S. affine* Ren. & Card.; *S. imbricatum* var. *læve* Warnst. in Hedwigia, 1889, pp. 367–372. Comb-fibrils completely absent.

45. S. DEGENERANS Warnst. in Bot. Centralbl. xlii. 1890, 102.

Plant completely submerged, green above, greyish below. Stem slender, 20–30 cm. long, with long, thin, stem-like branches from the middle or the upper part.

Wood-cylinder whitish or pale yellowish. *Stem-cortex* of the main axis in 2–3 layers; cells very wide and thin-walled, either quite without fibrils or with few very delicate fibrils; pores on the superficial wall numerous (up to six in each cell), large and non-ringed. Cortex of the main branches in two layers.

Stem-leaves on the lower part of the main axis large, widely oval, not widened towards the apex nor spatulate as in the other European *cymbifolia*, but widest in the middle; with a border of narrow, septate, hyaline cells on the broad rounded apex and for same distance down the lateral margins; either quite without fibrils or fibrillose in the upper three-fourths and with pores on both sides; on the outer surface towards the leaf-base with large membrane-gaps in the middle of the cell-walls. Leaves of the main branches resembling those of the spreading branches in form and cell-structure, but larger; sometimes quite without fibrils, more frequently fibrillose and porose to the base; not rarely in the upper one-third formed of chlorophyllose cells only.

Fascicles distant, in the lower part of the plant composed of three branches. of which two are stronger and spreading, and the third is weaker and appressed to the stem; the fascicles on the

main branches are generally very incompletely developed, and form at the apex of each branch a very small capitulum with obtuse branches. Cortex of the branches with numerous fibrils and pores. Spreading branches very thin, about 1–1½ cm. long, tapering towards the apex, and either recurved or almost horizontal. *Leaves* on the lower branches more or less loosely placed, on the upper ones closely imbricate and with squarrose apex; from a narrower base much widened to the middle and then narrowed to a shorter or longer, wide, obtuse, cucullate apex, as in *S. cymbifolium* f. *squarrosula;* in the upper part frequently with 2–5 rows of shorter and narrower chlorophyllose cells on the lateral margins, the apex also being frequently formed of such cells alone. Hyaline cells remarkably narrow and long; the chlorophyllose cells, on the contrary, seen from the inner side, very wide, showing, as is the case with many aquatic forms in the *cuspidatum* group, a tendency for the chlorophyllose cells to increase at the expense of the hyaline cells. Pores on the inner surface scattered; in the upper cell-angles, towards the lateral margins, generally more numerous and in the middle of the cell-wall; on the entire outer surface with numerous round pores in almost every cell-angle.

Chlorophyllose cells in section broadly isosceles-trapezoid, free on both surfaces, the wall generally strongly convex on the inner surface, slightly convex on the outer surface; lumen very wide, full of chlorophyll; wall never thickened; hyaline cells almost equally convex on both surfaces, and the inner wall, where united to the chlorophyllose cells, always entirely without papillæ. Towards the leaf-apex the chlorophyllose cells in section are quadrate or even wider than high, approaching the hyaline cells in form and size, and, like these, are flat on both surfaces.

Flowers and fruit unknown.

Distrib. England (Carrington Moss, Cheshire, *Holt*, 1886); Germany.

This curious bog-moss at the first glance might be taken for a submerged form of *S. cuspidatum* or a slender and submerged form of *S. squarrosum*, but it would not be suspected that it was a member of the *cymbifolium* group, from all the other members of which it is abundantly distinct. The method of branching is peculiar to this plant and to *S. monocladum*. It is very distinct from any other species in the *cymbifolium* group by—(1) the almost entire absence of fibrils in the stem-cortex; (2) the form and structure of the stem-leaves; (3) the transection of the branch-leaves; and (4) the pore-formation of the branch-leaves.

46. S. TURFACEUM Warnst. in Schrift. Naturf. Ges. in Danzig. N. F. Bd. ix. Heft ii. p. 161, 1897.

Tufts dirty brown or green, resembling in habit *S. cymbifolium*.

Stem-cortex in 3–4 layers; cells wide and thin-walled, with numerous fibrils, each with 3–6 (rarely more) pores.

Wood-cylinder brownish.

Stem-leaves very large, from a narrower base widened to the middle, and thence produced into the broad, cucullate, obtuse apex,

which has the margins incurved; fibrillose to the base; on the inner surface with numerous round pores, especially near the lateral margins; on the outer surface with semi-elliptical pores in rows on the commissures, which pass over near the apex into large membrane-gaps.

Spreading branches elongated, acuminate at the apex, with the cortical cells very fibrose and porose. *Branch-leaves* very large, longly ovate, and with the upper half distinctly squarrose (? always); pore-formation as in the stem-leaves.

Chlorophyllose cells in section broadly-trapezoid (up to 12 μ wide) (rarely broadly-triangular), with the longer parallel side exposed on the inner surface of the leaf, generally free on both surfaces. Hyaline cells not papillose.

Hab. In wet boggy places.

Distrib. Germany; England. Brookwood, Surrey (*Monington & Horrell*); Barnet Wood, Hayes Common, W. Kent (*Cocks*); Hole Common, near Lyme Regis, Dorset (*Miss Lister*); Wild Moorstone Wood, near Buxton, Derbyshire (*Ley*); Tilgate Forest, Sussex (*Horrell*); Trelleck Bog, Monmouth (*Ley*); Longridge Fell, W. Lancs. (*Wheldon*); Clougha, W. Lancs. (*Wheldon*); Arkholme Moor, W. Lancs, (*Wilson*); Cockerham Moss, W. Lancs. (*Wheldon & Wilson*); Lake Gormire, near Thirsk, N. Yorks (*Wheldon*); near Virginia Water, Surrey (*Mayes*); Wimbledon Common, Surrey (*Mayes*).

This species comes very near *S. cymbifolium*, but must, especially on account of the broadly-trapezoid chlorophyllose cells, be held to be distinct. From *S. degenerans*, too, with which it agrees in the form of its chlorophyllose cells, it differs in the strongly fibrose stem and branch cortical cells, the wider and shorter hyaline cells of the branch-leaves, and the quite different habit.

(To be continued.)

A NEW SPECIES OF UNCINULA FROM JAPAN.

By Ernest S. Salmon, F.L.S.

Since the completion of my monograph of the *Erysiphaceæ* (Memoirs of the Torrey Bot. Club, vol. ix.) much fresh material has been sent to Europe by Japanese mycologists. Dr. Hennings (in Engler's Bot. Jahrb. xxviii. 271–272; and xxix. 147–150 (1900)) and Mr. P. Sydow (Mém. de l'Herb. Boiss. No. 4, p. 4 (1900)) have worked at this material. Notes on some of this new material and an account of all the species known from Japan will be found in my article "The *Erysiphaceæ* of Japan" in Bull. Torr. Bot. Club, xxvii. 437–450, pl. 26 (1900).

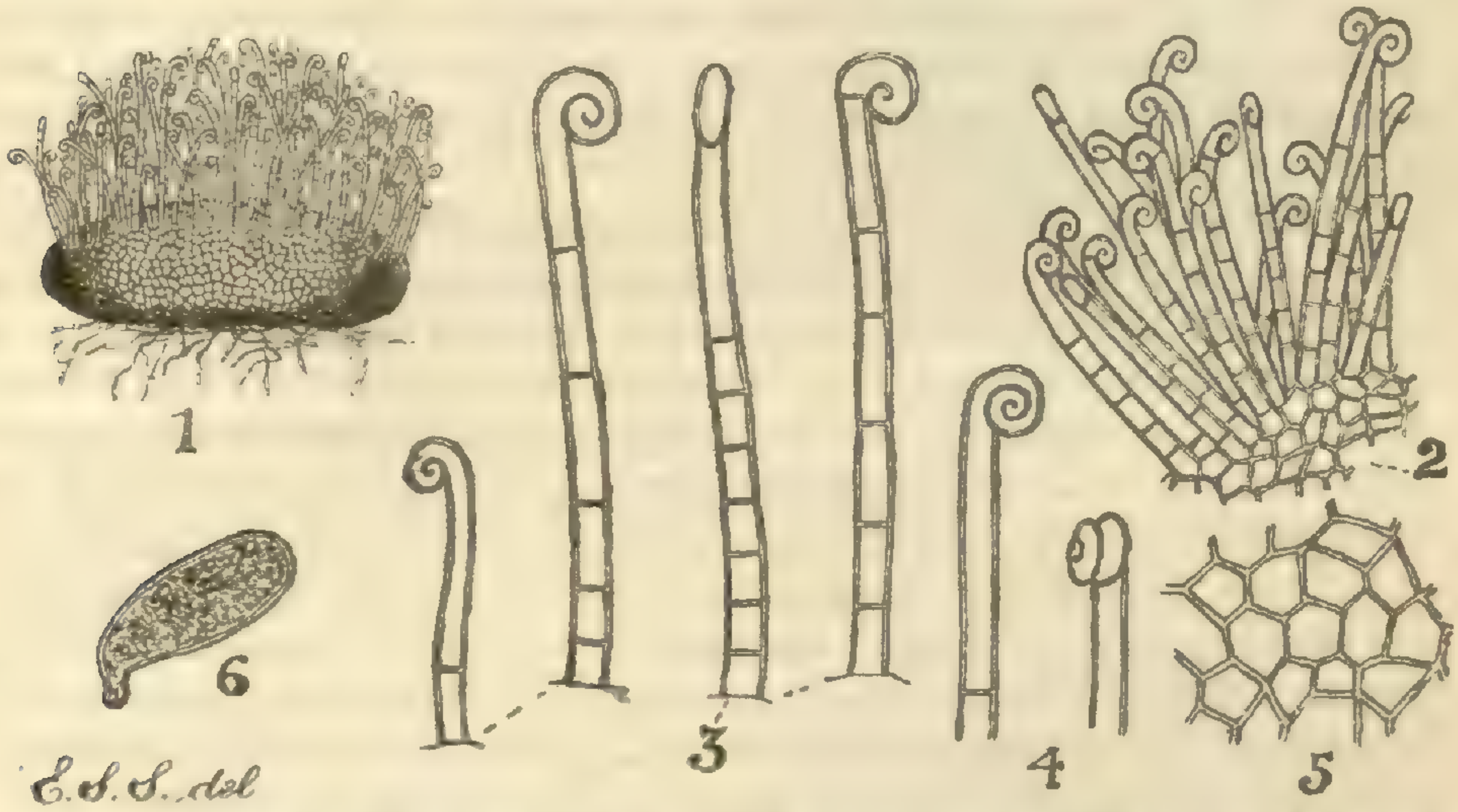
That the *Erysiphaceæ* of Japan have not yet been completely worked out, however, is shown by the occurrence of a very distinct new species, described below, belonging to the genus *Uncinula*. This new species grows on *Quercus glandulifera* Bl., and was found,

associated with *Sphærotheca Kusanoi* P. Henn. & Shirai, on a specimen (now in the Kew Herbarium) kindly sent to me by Dr. Hennings.

The following is a detailed description of the fungus :—

Uncinula septata, sp. nov. Hypophyllous; mycelium evanescent; perithecia more or less scattered, large, rounded-lenticular, 160–210 μ in diameter, cells of outer wall of perithecium distinct, small, 5–10 μ wide; appendages crowded, very numerous, 100–170 or more in number, unequal in length (50–100 μ long) on the same perithecium, simple, smooth, 1–8- (usually about 5-) septate, amber-coloured in the lower half, thin-walled throughout, about 5 μ wide, apex often helicoid; asci 6–12 (immature).

Hab. Japan; Mt. Myogi, Prov. Kozuké, on leaves of *Quercus glandulifera* Bl. (associated with *Sphærotheca Kusanoi* P. Henn. & Shirai) (Kusano, no. 123 (in part), Nov. 4, 1899).



Explanation of Figures. — Fig. 1. Perithecium, with its mass of densely crowded septate appendages, × 160. 2. Portion of outermost wall of perithecium, with appendages, × 270. 3. Four appendages, × 400. 4. Two appendages, showing the helicoid apex, × 400. 5. Cells of the outer wall of the perithecium, × 400. 6. An immature ascus, × 400.

In habit, and in the large size of the perithecia, *U. septata* resembles *U. circinata* Cooke and Peck, from which it is at once distinguished by the septate appendages; from *U. necator* (Schwein.) Burr. and *U. australiana* McAlp.—the only species of the genus at present known which possess coloured (septate) appendages—the large perithecia with the crowded appendages at once distinguish the present species. The absence of spores in the ascus shows that the specimens examined are immature; but I have no hesitation in describing the plant in this condition, as the presence of densely crowded septate appendages shows it to be quite distinct from all other species at present known. The appendages when well developed cover more or less completely the upper half of the perithecium—just as is the case in *U. circinata*. Seen in the mass, the appendages are of a pale amber tint; very probably they acquire, towards the base, on maturity, a deeper shade of brown, like those of *U. necator*.

NEW PLANTS FROM CENTRAL ASIA.

The following novelties were collected by Capt. H. H. P. Deasy, in 1897 and 1898, in Northern Tibet and Chinese Turkestan. A sketch-map illustrating his route has been published by the Royal Geographical Society (April 2nd, 1900). The types will be found in the Department of Botany of the British Museum.

Lactuca (§ Brachyrhamphus) **Deasyi** S. Moore. Planta humillima habitu *Crepidis* cujusdam ad sectionem *Glomeratam* pertinentis, caule incrassato glabro, foliis parvis spathulatis obtusissimis integris manifeste 3-nerviis plus minus araneoso-pilosis, capitulis caulis ex apice aliquantulo dilatato convexo oriundis ibique dense aggregatis et subsessilibus, capitulis anguste cylindricis 4-flosculosis, involucri phyllis exterioribus 2 quam reliqua paullo brevioribus linearibus deorsum parum dilatatis, phyllis intermediis 2 oblongis una cum intimis 2 oblongo-ovatis et margine scariosis obtusissimis phyllis omnibus sursum pilosis ceteroquin glabris, achæniis compressis oblongis deorsum parum angustatis apice in rostrum brevissimum abrupte contractis multicostatis.

Hab. Aksu, Chinese Turkestan, alt. 16,500 ? ft., July, 1898.

Caulis 4·0 cm. alt., 0·7 cm. diam., sursum usque ad 1·0 cm. dilatatum. Folia 2·5–3·5 cm. long., 0·5–0·6 cm. lat., deorsum in sicco corrugata et 0·2 cm. lat. Capitulorum glomeruli circa 3·0 cm. diam. Pedunculi modo 0·1–0·15 cm. long. Involucrum 1·2 cm. long., 0·4 cm. lat.; phylla basin versus connata. Achænia 0·6 cm. et pappi setæ deorsum stramineæ sursum griseæ 1·0 cm. long.

A very remarkable species, so extraordinarily like a *Crepis* of § *Glomeratæ*—resemblance extending even to the partial union of the involucral leaves—that its true affinity was not suspected until the achenes came under examination. There is, I think, no known species of *Lactuca* with which this could possibly be confounded.

Polygonum tibeticum Rendle. Herba minor caule simplici tenui superne hirsutulo, ocreis vix hypocraterimorphis hirsutulis, limbo brevi vix patente setoso-ciliato; foliis membranaceis ellipticis vel subovatis subacutis vel acutis; petiolo tenui hirsutulo infra ocreæ medium inserto; lamina præcipue venis marginibusque pilosula; spica solitaria, sessili, densa, oblonga, bracteis sanguineis late ovatis subacutis, glabrescentibus, cum margine ± ciliolato; floribus majusculis sanguineis, perianthii foliis 5, petalinis; staminibus 7 cum squamulis perigynis alternantibus; stigmatibus binis pileiformibus; achænio . . . .

Slender plants 30–35 cm. high, the lower internodes barely 2 mm. thick, glabrous. Ocrea membranous, tubular, with scarcely spreading greenish short limb with a shortly setose margin. Leaves (including petioles) to 5 cm. long by 2 cm. broad, blade passing somewhat abruptly into a petiole about one-third its length. Spike 1·5–2 cm. long by 1 cm. broad, bracts with a shortly hairy margin, otherwise almost glabrous; flowers crimson, closely resembling those of *Polygonum orientale* L.; perianth-leaves ellipsoidal, 5 mm. long by about 3·5 mm. broad; filaments subulate, about 3·5 mm. long, anthers attached in the middle, 1 mm. long; ovary round,

compressed, equal in length (barely 1·5 mm.) to the style with its two subsessile cap-shaped stigmas: fruit not present.

A member of Meisner's section *Amblygonon*, and most nearly allied to *Polygonum orientale* L., the flowers being almost identical in the two species; but ours is a smaller plant with a different habit, expressed in its unbranched stem, and almost sessile solitary flower-spike; the thinner texture and less elongated form of the leaves also distinguish it.

Hab. Northern Tibet.

Allium consanguineum Kunth, var. roseum Rendle, var. nov. Indistinguishable from the species except by its rose-coloured flowers; those of the species are described as golden-yellow.

Hab. Sarok Tuz Valley, alt. 13,000 ft., July, 1898.

Festuca rubra L. var. robusta Rendle, var. nov. Laxe cæspitans, innovationibus extravaginalibus interdum ascendentibus, interdum sub terra repentibus, cum vaginis squamiformibus tectis, demum ascendentibus et caules basi robustos efformantibus; nodis, vaginis, foliisque glabris; foliis flaccidis plicatis vel convolutis; panicula flexuosa sublaxa, spiculis 4–5-floris, villosis iis *F. arenariæ* Osbeck (*F. rubra* var. *arenaria* Fr.) similibus.

Plants about 35 cm. high, characterized by their robust growth at the base of the shoots, and the leaves, which are remarkably flaccid for the species; the blades are generally between 7 and 14 cm. long and about 3 mm. broad when opened out.

The Turkestan plant resembles somewhat specimens collected by Mr. C. B. Clarke at Karakorum, at 13,500 ft. (No. 30335 in herb.), but the latter has not the robust growth referred to; and the spikelets have more flowers, with slightly narrower fertile glumes.

Hab. Shiran Maidan Hunza Valley, five miles from Kilak Pass, 13,000 ft., October, 1897. Common.

Festuca Deasyi Rendle. Cæspitosa, glabra, glauca, innovationibus intravaginalibus, caulibus cum vaginis membranaceis marcidis basi indutis, florentibus cum internodiis tribus quæ sæpius a vaginis striatis arcte inclusa sunt; ligula brevi membranacea truncata, laminis rigidulis anguste linearibus, sæpius convolutis, venis prominentibus, marginibus scabridulis; panicula sublaxa, sæpius stricta, axi scabridulo, radiis simplicibus, infimis ternis, superioribus binis; spiculis subsessilibus, valde compressis, sæpe 4–6-floris, floribus dioicis; glumis membranaceis et pallide viridibus in parte superiore lucidis et tenuibus; gl. sterili inferiora anguste-lanceolata acuta, uninervia, quam gl. superior ellipsoideo-oblonga obtusa paullo breviore; hac quoque uninervia, vel basi 3-nervia; gl. fertilibus anguste ovatis, apice subobtusis vel subacutis, cum nervo mediano dorso prominente scabridulo, et utrinque nervis binis supra medium obsoletis; palea valde binervata, nervis viridibus scabridulis; lodiculis suboblongis; antheris linearibus; stylis in floribus masculis subfiliformibus, sparse et breviter pilosis.

Plants about 1½ ft. high, covered for 10–11 cm. at the base with withered leaf-sheaths; ligule ½ mm. long, generally split, blades 20–25 cm. or less in length by a little over 2 mm. or less in width when flat; panicle 10–12 cm. long, branches subfiliform, scabrid-

ulous, longest branch at the lowest node 6 cm., at the upper nodes gradually shorter, bearing three, two, or a single spikelet. Spikelets ultimately obovate, 10–12 mm. long, pale green or sometimes tinged with purple, the glumes becoming colourless and transparent in their upper portion. Lowest barren glume 5·5 mm. long, very acute and much narrower than the upper, which is 7 mm. long by 1·75 mm. broad. Fertile glumes 9–7 mm. long by 2·5–2 mm. broad, pale 7–6 mm. by 1·3–1 mm. Lodicules broadly oblong, becoming somewhat obliquely narrowed at the top, 1·3 mm. long, anthers 5–4 mm. long.

Near *F. sibirica* Hackel, but distinguished by its very acute lower barren glume, longer lower fertile glumes and pales, and other points of detail.

Hab. Plateau near Polu, 10,000 ft., June, 1898. Native name "Kileb."

CAROLI LINNÆI REGNUM VEGETABILE.

LINNÆUS's *Systema Naturæ*, ed. i—a folio work 21 in. × 16½ in. —is so rare and difficult of access that it is thought a transcript of it, so far as the botanical classification is concerned, may be of interest. The pages in the original devoted to the vegetable kingdom are four in number: the first contains the "Clavis Systematis Sexualis"; the fourth "Observationes in Regnum Vegetabile"; the second and third, which face each other, give in tabular form the classification. This is reproduced textually; the abbreviations (some of them the result of want of space), orthography, punctuation, etc. are those of the original; and the typographical and other arrangements are as nearly as possible adhered to.

The preface is dated from Leyden, July 23, 1735.]

AUCTORES *Systematici allegati.*

A. *Acta Parisiens.* Tourn.
B. BOERHAAVE.
Bx. Buxbaum.
C. CÆSALPINUS.
D. DILLENIUS.
G. Gronovius. qui multas mecum communicavit plantas peregrinas, e quibus nova genera adposui.
H. Heicherus.
Hs. Heisterus.
I. Jussieu.
K. Knautius fil.
M. Michelius.
Mg. MAGNOL.
Mr. Martyn.
Pl. Plumier.
Pn. Pontedera.
Rj. RAJUS.
Rp. Ruppius.
Rv. RIVINUS.
S. Scheuchzer.
T. TOURNEFORTIUS.
V. Vaillantius.

VI. 100. Vide Hexandriam Hexagyniam, Ubi VI.
100. *Alism: Damason.* posui, id est: Damasonium Tournefortii, est ejusdem generis cum Alisma in Hexand. Polygynia.

* Indicat plantarum flores, a me hactenus non examinatos, sed à fida Auctorum descriptione vel Figura heic insertos.

† Nova genera a me constituta.

MONANDRIA.

Stamen Unicum.

MONOGYNIA.

Hippuris. *Limnopeuce.* V.
Canna. *Cannacorus.* T.

DIGYNIA.

Corispermum I.
Stellaria D.

DIANDRIA.

Stamina Duo.

MONOGYNIA.

α. Flos regularis.

Olea.
Ligustrum.
Jasminum.
Syringa. *Lilac* T.
Veronica.
Saliunca. Bx.
Beccabunga. Rv.
Veronicella. Hs.
Veronicastrum. Hs.
Circæa.

β. Fl. Irr. Angiosp.

Utricularia. *Lentibularia* R.
Pinguicula.
Morina T. *
Lathræa *. *Clandestina* T.
Ecbolium Rv. *Adhatoda* T.
Bignonia T. *Gelsemin.* Rv.

γ. Fl. irr. gymnosp.

Rosmarinus.
Lycopus. T.
Salvia T.
Horminum T.
Sclarea T.

TRIANDRIA.

Stamina Tria.

MONOGYNIA.

α. Calice vix ullo.

Valeriana T.
Phu Rp.
Valerianella T.
Boerhaavia V.

β. Calice perianthio.

Tamarindus *.
Bannisteria *. † *Soneri-ila.*
Cneorum. *Chamælea* T.

γ. Calice Spatha.

Crocus.
Gladiolus.
Antholyza †.
Iris T.
Xiphium T.
Sisyrinchium T.
Hermodactylus T.
Rumpfia. †
Commelina Pl.

δ. Calice gluma.

Cyperus.
Scirpus.
Eriophorum. *Linagrostis* T.

DIGYNIA.

α. Glumosi Spicati.

Hordeum.
Triticum.
Secale.
Phalaris.
Alopecurus.
Phleum †. *Gr. typhoides.*
Lolium †.
Nardus †. *Gr. Sparteum.*

β. Glumosi paniculati.

Panicum.
Milium.
Briza †.
Agrostis †.
Bromus †.
Festuca †.
Avena.

γ. Perianthio instr.

Polysporon †.
Morocarpus Rp.

TRIGYNIA.

Montia M. *Cameraria* D.
Tillæa M. *.

TETRANDRIA.

Stamina Quatuor.

MONOGYNIA.

α. Calice Communi.

Protea. *Lepidocarpod.* B.
Conocarpodendron B.
Hypophyllocarpod. B.

Dipsacus.
Scabiosa.
Succisa Kn.
Knautia. *Lychni-scabios*. B.

β. Stellatæ Rj.

Gallium.
Aparine.
Asperula.
Rubeola.
Houstonia †. G.
Sherardia D. *Dillenia* Hs.
Spermacoce D. *
Crucianella.
Rubia.

γ. Varii.

Plantago.
Coronopus T.
Psyllium T.
Sarcocolla †.
Catisbea † G.
Centunculus D. *.
Lippia *.
Camara Pl. *Morobatind.* V.
Vitex.
Poterium. *Sanguisorba* Rp.
Epimedium.
Avicennia †. *Oepata* H M.
Tithona†. *Phytolac. sp.* T.
Cornus.
Mesomora Rudb.
Ossea Rv. *Virg. sang.* D.
Evonymus.
Ptelea. *Frut. Virg. trif.* D.*
Ixora† *Schetti* H M.

δ. Incompleti.

Alchemilla.
Elæagnus.
Mimosa.

§. VI. 1. *Conv. Unifolium* D.

DIGYNIA.

Hypecoon.
Bocconia Pl. *.
Cuscuta.
Basella H M. B.

TETRAGYNIA.

Ilex. *Aquifolium* T.
Cassina †.
Potamogeton.

§. V. 5. *Lin. Radiola* D.

PENTANDRIA.

Stamina Quinque.

MONOGYNIA.

α. Fl. Imperfecti.

Herniaria.
Paronychia *.
Blitum.
Vitis.
Persicaria VI. 2.
Glaux.
Rhamnus T. *Cervispina* XXII. 4.
Frangula T.
Alaternus T.
Paliurus T.

β. Petal. 1. Semina 4.

Anchusa. *Buglossum* T.
Cynoglossum.
Lappula Rp.
Lithospermum
Pseudo-Anchusa H.
Myosotis D. *Scorpiurus* Kn.
Heliotropium.
Pulmonaria.
Symphytum T. *Consolida* Rv.
Lycopsis. *Echioides* D.
Asperugo.
Borrago.
Cerinthe.

γ. Petal. 1. Semin. 2.

Phyllis. *Bupleuroides* B.

δ. Petal. 1. Semin. 1.

Mirabilis Rv. *Jalapa* T.
Plumbago T. *Dentillaria* R.

ε. Petal. 1. caps. 1-locular.

Hydrophyllum.
Swertia †. *Gentianæ sp.* aliis.
Hottonia B. *Myriophyllnm* Rp.
Samolus.
Menyanthes.
Nymphoides T.
Lysimachia.
Nummularia B.
Anagallis.
Cyclamen.
Soldanella.
Ruellia Pl.
Primula. *Prim. veris* T.
Auricula ursi T.

Androsace.
Armeria. *Lychnidea* D.

ζ. Pet. 1. caps. 2-locul.

Verbascum T.
Blattaria T.
Hyoscyamus.
Apollinaris. *Priapeja* Kn.
Nicotiana.
Datura. *Stramonium* T.
Myrsine †.

η. Pet. 1. Caps. 3-locul.

Convolvulus.
Convolvuloides Hs.
Ipomœa. *Quamoclit* T.
Campanula.
Phyteuma. *Rapunculus* T.
Polemonium.
Trachelium.
Polypremum.†

θ. Petal. 1. Caps. 4-locul.

Diervilla A.

ι. Petal. 1. Caps. 5-locul.

Diosma. † *an Anisi stellati sp?*
Azalea. †. *Chamærhododend.* T.

κ. Petal. 1. Bacciferæ.

Atropæa. *Belladonna* T.
Mandragora.
Solanum,
Melongena T.
Lycopersicum T.
Capsicum.
Physalis. *Alkekengi* T.
Strychnos †. *Vomica.* *.
Genipa. *.
Tinus.
Phillyrea.
Patagonica D. *.
Sideroxylon *.
Coffea. *Coffe* Hs.
Fuchsia *.
Tournefortia. *Pittonia* Pl. *.
Lycium. *Jasminoides* A.
Caprifolium T.
Periclymenum T.
Chamæcerasus T.
Xylosteum T.

λ. Petala 5 æqualia.

Cuminum. *Cuminoides* T.
Telephium T.
Brunia †. *Levisanus* Pet.
Gronovia. Houst. apud. Mr.

μ. Pet. 5 inæqualia.

Viola.
Impatiens Rv. D.
Balsamina Rv. T.

DIGYNIA.

α. Variæ.

Chenopodium.
Beta.
Ulmus.
Salsola. C. *Kali* T.
Panax *. *Araliastrum* V.
Gentiana T.
Centaurium minus T.
Heuchera †. *Cortusa* Hr.
§. XII. 2. *Agrimonoides* T.
§. XX. 2. *Ribes.*
§. V. 3. *Staph. Zanthoxyl.* Ctb.

β. Fr. Bifollicularis.

Plumeria T.
Vinca Rp. Pervinca T.
Nerium.
Tabernemontana Pl. *
Cameraria Pl. *
Apocynum.

γ. Umbella Simplex.

Eryngium.
Hydrocotyle.
Sanicula.
Astrantia.

δ. Umb. Composita, involucro nullo.

Carum Rv. *Carvi* T.
Fœniculum T.
Anethum T.
Apium.
Anisum Rv.
Ægopodium Kn. *Podagrar.* Rv.
Pimpinella.
Pastinaca.
Heracleum. *Sphondylium* T.
Smyrnium.
Imperatoria Rv.

ε. Umbella Composita 1, involucro particulari.

Cicuta †. *Cicutaria* Rv.

Phellandrium.
Oenanthe.
Ethusa. *Cynapium* Rv.
Chærophyllum.
Myrrhis Rv.
Myrrhis. *Odorata* Rv.
Scandix.
Cerefolium Rv.
Thapsia.
Coriandrum.
Bupleurum T.
Perfoliata Rv.

ζ. Umbella Composita inv. part. et Univers.

Laserpitium.
Angelica.
Sium.
Sisarum T.
Conium. *Cicuta* Rv.
Thysselinum.
Daucus.
Staphylinus Rv.
Caucalis.
Peucedanum.
Athamanta. *Meum* T.
Levisticum Rv.
Cicutaria T.
Ammi.
Crithmum.
Cachrys.

TRIGYNIA.

Tamarix. *Tamariscus* T.
Viburnum.
Sambucus T.
Ebulus Pn.
Opulus T.
Cotinus.
Staphylæa V: I. *Staphylodendr.* [T.
§. V. 2. *Chenopodium.*

TETRAGYNIA.

Parnassia.

PENTAGYNIA.

Linum IV. 4.
Drosera. *Ros Solis* T.
Aralia T. V.
Statice T.
Limonium T.
Crassula D.
Cotyledon.

POLYGYNIA.

Myosurus Kn. D.

HEXANDRIA.

Stamina Sex.

MONOGYNIA.

α. Fl. Incompl. VI-Petal.

Lirium.
Martagon Rp.
Petilium. *Corona Imper.* T.
Fritillaria.
Tulipa.
Erythronium. *Dens canis* T.
Gloriosa. *Methonica* A.
Ornithogalum.
Scilla.
Asparagus.
Leontice. *Leontopetalum* T.

β. Fl. Incompl. 1-Petal.

Convallaria IV. 1. *Lil. Conv.* T.
Polygonatum T.
Hyacinthus.
Muscari T.
Polyanthes. *Tuberosa* Hs.
Susiana. *Lil. Susianum.*
Asphodelus.
Hemerocallis. *Lilio-asphod.* T.
Liliastrum T.
Aloë T.
Yucca D.

γ. Fl. Completus.

Ananas T.
Bromelia Pl.
Tillandsia. *Caraguata* Pl.
Tradescantia Rp. *Ephemer.* T.
Burmannia. †.
Lithocardium. * *Sebestena* D.
Berberis.

δ. Fl. Spataceus.

Pancratium D.
Narcissus.
Amaryllis. *Lilio-Narciss.* T.
Leucojum. *Narcisso-Leuc.* T.
Galanthus †.
Prasum. *Scordoprasum* M.
Porrum.
Cepa.
Allium.
Pontederia †. G. Pet. Gaz. 1. 12.

ε. Fl. Involucratus.
Hæmanthus.
ζ. Fl. Glumosus.
Juncus.
η. Fl. Apetalus.
Peplis. *Portula* D.

DIGYNIA.
Atraphaxis *. *Atripl. or. acul.* D.
Oryza *.
§. V. 1. *Persicaria.*
§. VI. 3. *Rumex Acetosa.*

TRIGYNIA.
Scheuchzeria †. *Juncoidi af.* S.
Triglochin. Rv. *Juncago* T.
Rumex. *Lapathum* T.
Acetosa T. VI. 2. ⋌ VI.
Anthericum. *Phalangium* T.
Colchicum.
Medeola † *G. Ipecacuanha?*
Menispermum.
§. VII. 4. *Paris.*

HEXAGYNIA.
§. VI. 100. *Alis. Damason.* T.

POLYGYNIA.
Alisma. VI. 6. *Plantaginoid.* Kn.

HEPTANDRIA.
Stamina Septem.

MONOGYNIA.
Trientalis Rp.
Castanea. *Hippocastanum.*

OCTANDRIA.
Stamina Octo.

MONOGYNIA.
Rivina Pl. *.
Daphne. *Thymelæa* T.
Erica.
Vaccinium. *Vitis idæa* T.
Oxycoccus T.
Ruta.
Monotropa. *Hypopitys* D.
Oenothera. *Onagra* T.
Epilobium D. *Chamænerion* T.
Crateva. * *Tapia* Pl.
Trophæum. *Cardamindum* T.
Pavia B.
Melianthus.
Acer.
Cliffortia. †. G.
Cæsalpina Pl. *

DIGYNIA.
Chrysosplenium T.
Galenia.

TRIGYNIA.
Bistorta.
Polygonum.
Helxine. *Fagopyrum* T.
Seriana Pl.
Ururu Pl.
Cardiospermum. *Corindum* T.

TETRAGYNIA.
Paris VI. 3.
Adoxa. *Moschatellina* T.
Sagina. *Alsinella* D.
Potamopithys B.
§. X. 5. *Sedum.*

ENNEANDRIA.
Stamina Novem.

MONOGYNIA.
Camphora †.
Cinnamomum. *Lauri species.*

TRIGYNIA.
Rheum. *Rhabarbarum* T.

HEXAGYNIA.
Butomus.

DECANDRIA.
Stamina Decem.

MONOGYNIA.

α. Antheræ Bicornes.
Arbutus.
Uva Ursi T.
Andromeda. *Ledum* Rj.
Ledum M.
Chamædaphne Bx.
Polifolia Bx.
Pyrola.

β. Stamina Irregularia.
Dictamnus. *Fraxinella* T.
Cassia T.
Senna T.
Poinciana T.
Cercis. *Siliquastrum* T.
Hæmatoxylon †. *Camperia* Sl.
Acinodendron. Plk. † *Malab.* off.

γ. Stamina Regularia.

Malpighia Pl.
Averrhoa. † *Bilimbi* H M.
Zygophyllum. *Fabago* T.
Fagonia T.
Tribulus T.
Portulaca.
Clethra †. G. *Alnifolia* Plk.
Anacardium. *Acaiv* T.

δ. Calix nullus.

Ledum Rp.

DIGYNIA.

Mitella T.
Saxifragia T.
Geum T.
Dianthus. *Caryophyllus* T.
Armeria H.
Saponaria †.
Scleranthus. *Knawel* D.

TRIGYNIA.

Garidellia T.
Drypis M.
Silene. X: 5. *Muscipula* Rp.
Cucubalus. ☿ : 10. X: 5.
Behen.
Alsine.
Arenaria Rp. *Spergula* D.
Lychnoides V.

PENTAGYNIA.

Lychnis.
Agrostema. *Nigellastrum.*
Cerastium D. *Myosotis* T.
Spergula †.
Benzoa †. G. Benzoë: *an ?*
Sedum T. VIII. 4. Y. d.
Anacampseros T.
§. X. 3. *Silen: Viscaria* Rp.
§. X. 3. *Cucub. Lychnis.*

DECAGYNIA.

Phytolacca T.

DODECANDRIA.

Stamina Duodecim.

MONOGYNIA.

Asarum.
Lythrum. *Salicaria* T.

DIGYNIA.

Agrimonia V. 2.
Agrimonoides T. V. 2.

TRIGYNIA.

§. XXX: 1. *Euph. Tithymalus* T.
Euph. Elutheria Pet. * G.

DODECAGYNIA.

Sempervivum Rp.

ICOSANDRIA.

Stamina Calici adnata.

MONOGYNIA.

α. Fructu Drupa.

Zizyphus T.
Eugenia M.*
Amygdalus.
Persica T.
Prunus.
Armeniaca T.
Cerasus.
Padus.
Guajacum Pl. *

β. Fr. Bacca *vel* Pomo.

Myrtus.
Punica.
Styrax.
Citrus. S. 100.
Aurantium T.
Limon.

γ. Fr. Capsula.

Philadelphus. *Syringa* T.

DIGYNIA.

Ribes. *Grossularia* T. V. 2.
Cratægus T.
Oxyacantha Rp.

TRIGYNIA.

Sorbus.
Aucuparia Rp.
Cotoneaster.

PENTAGYNIA.

Mespilus.
Pyrus.
Malus.
Cydonia.
Spiræa.

POLYGYNIA.

Muntingia Pl. *
Rosa.
Rubus.
Chamæmorus Rj.

Fragaria.
Camaroides Pn.
Potentilla. *Pentaphylloides* T.
Quinquefolium T.
Tormentilla. XVI. 8.
Dryadæa †.
Comarum †.
Geum. *Caryophyllata* T.

POLYANDRIA.

St. multa recept. adnata.

MONOGYNIA.

α. Calice Caduco.

Actæa. *Christophoriana* T.
Podophyllum. *Anapodophyl.* T.
Corchorus.
Sanguinaria D. *
Chelidonium T.
Glaucium T.
Papaver T.
Argemone T.
Sarracena T. *Coilophyllum* Ms.
Tilia.

β. Calice Persistente.

Peganum. *Harmala.*
Nymphæa.
Leuconymphæa B.
Michelia. † *Samstravadi* H M.
Anacampseros. *Telephiastr.* D.
Cistus.
Helianthemum T.
Caryophyllus. *Car. arom.* T.
Thea * †.
Mesua †. *Belutta* H M.
Capparis.
Plinia. Pl. *

γ. Calice Tabescente.

Euphorbium L. 3.
Cereus.
Opuntia T. *Tuna* D.
Cactus. *Melocactus* T.
§. N. 3. *Delphinium.*

DIGYNIA.

Pæonia.
Anona. *Guanabanus* Pl.

TRIGYNIA.

Pereskia Pl. *
Reseda T.
Luteola T.
Hypericum N. 5.
Androsæmum T.
Aconitum T. N. 5.
Delphinium N. 1.
Staphisagria Rp.

TETRAGYNIA.

Tetragonia. *Tetragonocarpos.*

PENTAGYNIA.

Aquilegia.
Nigella.
Aizoum *. *Ficoidea* N.
Mesembryanthemum D.
§. N. 3. *Hyper. Ascyrum.*
§. N. 3. *Aconitum.*

HEXAGYNIA.

Stratiotes. *Aloides* B.

POLYGYNIA.

Dillenia †. *Syalita* H M.
Magnolia Pl. *Tulipifera.*
Clematitis.
Atragena. *Viticella* D.
Pulsatilla.
Anemone.
Anemone-ranunculus D.
Nemorosa Rp.
Caltha Rp. *Populago* T.
Helleborus.
Trollius Rv. *Helleboro-Ran.* [B.
Helleboroides B. *Aconit.* Rv.
Ranunculus.
Ficaria D.
Ranunculoides V.
Ranunculo-asphodel. H S.
Adonis D.
Hepatica D.
Filipendula T.
Ulmaria T.

DIDYNAMIA.

Stam. 4. quor. 2 longiora.

Gymnospermia. i.e. Seminibus Pericarpio nudis.

α. Petali Lab. Sup. nullo.

Bulga. *Bugula* T.
Polium.
Teucrium.
Trissago. *Chamæpitys* T.

β. Petali Lab. Sup. erecto.

Origanum T.
Majorana T.
Thymus T.
Satureja T.
Serpillum T.
Thymbra T.
Lavendula.
Stœchas.
Hyssopus.
Clinopodium.
Marrubium.
Betonica.
Glechoma. *Calamintha* T.
Chamæclema B.
Ruyschia. *Ruischiana* B.
Ocymum.

γ. Petali Lab. sup. concavo.

Mentha.
Menthastrum Rp.
Pulegium Riv.
Moldavica.
Volkamera Hs.
Stachys.
Galeopsis.
Ladanum D. *Tetrahit.* D.
Lamium.
Molucca.
Cardiaca.
Galeobdolon D.
Leonurus.

δ. Petali Lab. Sup. galeato.

Dracocephalon.
Scutellaria Rv. *Cassida* T.
Brunella.
Phlomis.

Angiospermia. i.e. Seminibus tectis Pericarpio.

Antirrhinum T.
Linaria T.
Elatine Rp.
Asarine T. *Cymbalar.* Rv.
Scrophularia.
Digitalis.
Gratiola Rv.
Volkameria †. *Digitalis sp.* T.
Chelone A.
Orobanche.
Squammaria Rv. *Anblatum* T.
Acanthus.
Melampyrum.
Fistularia. *Crista galli* Rv.
Pedicularis.
Euphrasia.
Odontites D.
Verbena
Sherardia V.
Selago. *Camphorata.*
Bontia *.
Dodartia *.
Phelypæa T *.
Crescentia *. *Cujete* Pl.
Celsia †.
Limosella. *Plantaginella* D.
Rhinanthus. *Elephas* T.
Martynia. Houst. apud Mr.
Æginetia †. *Tseemcumulu* H M.

TETRADYNAM.

Stam. 6, quor. 4 longiora.

FRUCTU SILICULOSO.

α. Pericarpio uniloculari.

Isatis.
Crambe.
Cakile.
Myagrum.
Bunias. *Rapistrum* T.

β. Peric. biloc. dissep. opposito.

Thlaspi T.
Bursa pastoris T.
Iberis D.
Biscutella. *Thlaspidium* T.
Nasturtium.
Iberis Rp.
Coronopus H. Rp.
Lepidium.
Armoracia Rp.
Cochlearia.
Subularia Rj. *Juncifolia* Rj.

γ. Peric. biloc. dissep. parall.

Alyssum.
Draba D.
Lunaria T. *Bulbonac.* Rp.

FRUCTU SILIQUOSO.

Erysimum.
Irio. *Eruca* T.
Sinapis.

Rapa.
Napus.
Brassica.
Turritis.
Hesperis.
Alliaria Rp.
Conringia Hs.
Dentaria.
Sophia. *Accipitrina* Rv.
Sisymbrium.
Radicula D.
Cardamine.
Raphanus.
Raphanistrum T.
Cleome. *Sinapistrum* T.
Cheri. *Leucojum* T.

MONADELPH.

St. Filam. coal. in 1 corp.

PENTANDRIA.

Hermannia.
Melochia D. *
Xerœa. *Amaranthoides* T.

DECANDRIA.

Azedarach.
Geranium X: 1.
Gruinalis.

POLYANDRIA.

Malva.
Alcea T.
Abutilon T.
Malope †.
Lavatera. A.
Gossypium. *Xylon* T.
Alcea. *Malva rosea.*
Althæa †.
Urena *.
Trionum. *Bammia* Rv.
Ibiscus. *Ketmia* T.
Camellia *. *Tsubaki.* Kp.
Sida. *Althæades.* Mg.
Fevillæa. *Inga* Pl.

DIADELPHIA.

St. Filamentis coalita in 2 corpora.

HEXANDRIA.

Fumaria T.
Capnoides T.
Split Rv.
Capnorchis B.
Cysticapnos B.

DECANDRIA.

i. e. Stamina coalita filamentis 9 in unum corpus, & 1 libero.

α. Fructu Siliculoso.

Polygala.
Cicer.
Lens.
Onobrychis.
Sertula. *Melilotus* T.
Dorycnium } ? simul.
Trifolium }
Coreba. *Lagopus* Rv.
Anthyllis Rv. *Vulneraria* T.

β. Fr. incurvo irregulari.

Medica T. *Falcata* Rv.
Medicago T. *Cochleata* Rv.
Hippocrepis. *Ferrum Eqv.* T.
Scorpiurus. *Scorpioides* T.
Ornithopodium.
Telis. *Fœnum Græcum* T.
Hedysarum.
Meibomia Hs.

γ. Fr. leguminoso ordin

Lotus.
Ononis.
Ternatea. *Clitoris.*
Corallodendron.
Colutea.
Ulex. *Genista-Spartium* T.
Spartium.
Genista.
Anagyris.
Cytisus.
Laburnum.
Orobus.
Vicia.
Arachis. *Cracca* Rv.
Lathyrus.
Clymenum.
Nissolia.
Lupinus.
Faba.
Pisum.
Phaseolus.

δ. Fr. Biloculari.

Biserrula. *Pelecinus* T.
Tragacantha.
Glycia. *Astragalus* T.

POLYADELPH.

Fil. coal. in plures part.

POLYAN.

Lasianthus †. G. *Alceæ sp. aliis.*

§. XX. 1. *Citrus.*

SYNGENESIA.

St. Antheræ coalitæ.

MONOGAMIA.

α. Flore Simplici.

Dortmanna Rd.

Rapuntium T. *Cardin.* Rv.

Laurentia M.

Jasione †. *Rapunculus scab. cap.*

β. Semiflosculosi T.

Lampsana.

Cichorium.

Catanance.

Zacintha.

Taraxacum. *Dens Leonis* T.

Pilosella.

Hieracium.

Sonchus.

Chondrilla.

Picris †.

Lactuca.

Scorzonera.

Tragopogon.

γ. Flosculosi T.

Chrysocome. *Linosyris* Mg.

Eupatorium.

Sphærocephalus. *Echinopus* T.

Santolina.

Vebesina. *Bidens* T. Pn.

Forbicina Pn.

Carlina.

Xeranthemum T. *Stœbe* Rv.

Serratula D.

Carthamus.

Carduus.

Cinara.

Arctium. *Lappa* T.

Cnicus.

Petasites.

Klenia †. *An Tithymaloides* B.

POLYGAMIA SUPERFLUA.

α. Radio petal. destituto.

Artemisia.

Absinthium.

Abrotanum.

Filago.

Ananthocyclus V.

Tanacetum T.

Baccharis D.

Senecio.

β. Radiati T. calice semi-globoso.

Achillea. *Millefolium* T.

Ptarmica T.

Anthemis. *Chamæmelum* T.

Buphthalmum.

Matricaria.

Bellis.

Leucanthemum.

Chrysanthemum.

Cotula.

γ. Radiati T. calice ventricoso.

Calendula. *Caltha* T.

Dimorphotheca V.

Tussilago.

Doronicum.

Arnica Rp.

Solidago. *Doria* D.

Virga aurea T.

Jacobæa.

Aster.

Amellus †.

Helenium. *Enula Camp.* Mg.

Erigerum. *Conyzoides* D.

Othonna. *Tagetes* T.

POLYGAMIA FRUSTRANEA.

α. Radiati T.

Helianthus. *Corona Solis* T.

Rudbeckia. *Obeliscotheca* V.

β. Flosculosi T.

Jacea.

Cyanus.

Centaurium. *Cent. maj.* T.

Crupina D.

POLYGAMIA NECESSARIA.

Parthenium. *Partheniastrum* D.

Milleria. Houst. apud Mr.

GYNANDRIA.

Stamina Pistillo adnata.

DIANDRIA.

Orchis.

Satyrium Rv.

Palmata Rv.

Satyrium.
Orchioides. Trew.
Neottia. *Corallorhiza* Rp.
Serapias. *Helleborine* T.
Herminium. *Monorchis* M.
Cypripedium. *Calceolus* Mar.
Epidendron †. G. *Orchidi aff.* Hr.
Ophris.
? Nidus Avis T.

TRIANDRIA.

Bermudiana.

TETRANDRIA.

Nepenthes †.

PENTANDRIA.

Asclepias. *Vincetoxic.* Rp.
Beidalsar Kn.
Periploca.
Stisseria. *Crassa* Rv.
Passiflora. *Granadilla* T.
Murucuja. T.
Clutia B.

HEXANDRIA.

Aristolochia.

DECANDRIA.

Helicteres. Plk. *Isora* Pl.

POLYANDRIA.

Grewia †. *? Guidonia* B.
Arum T.
Dracunculus T.
Colocasia Rj.
Arisarum T.
Calla. *Anguina* Trew.
Arioides B.
Acorus VI: 1.
Ruppia *. *Bucca ferrea* M.

Carex. *Cyperoides* T.
Scirpoides Mg. *Carex* Rp.
Diasperus. *Niruri* Mr.

IV AND.

Alnus.
Betula.
Buxus.
§. V. 4. *Urtica.*

V AND.

Amaranthus.
Jatropha *. *Manihot* T.
Andrachne. *Telephioides.*
Oxydectes. *Ricinoides* T.

POLYAND.

Stamina plus quam 7.

Ceratophyllum. *Dichotoph.* D.
Myriophyllum Pn.
Pentapterophyllum D.
Corylus.
Ostrya M.
Carpinus T. M.
Fagus.
Castanea *.
Quercus.
Ilex T.
Suber T.
Sagittaria Rp. D.
Sparganium.
Typha.

MONAD.

Pinus.
Abies.
Larix. *
Thuya. *
Cedrus. *
Xanthium.

POL.

Ricinus.

SYNGENESIA.

Bryonia.
Momordica.
Sicyos. *Sicyoides* T.
Tamnus.
Luffa Arab.
Anguria.
Colocynthis.
Cucumis.
Melo.
Pepo.
Cucurbita.
Anguina M.

MONŒCIA.

Plantæ Androgynæ.

MONANDRIA.

Zannichella M*. *Aponoget.* Pn.
Najas *. *Fluvialis* V.
Cynomorion M. *

TRIANDRIA.

Thalysia. *Mays* T.
Sphærium *. *Lacryma Jobi* T.
Ægilops. S. *
Ischœmum *. *Dactyloides.*

DIŒCIA.

Pl. Mares & Feminæ.

II AND.

Salix.

III AND.

Phœnix *. *Palma.*
Osyris. *Casia* T.

IV AND.

Morus.
Hippophaë *. *Rhamnoides* T.
Myrica. *Gale* A.
Urtica. V. 4.
§. V: 1. *Rham. Cervi Spina* D.

V AND.

Lentiscus.
Toxicodendron.
Humulus. *Lupulus* T.
Cannabis. ♂. 10.
Spinacia.

VI AND.

Smilax.
§. VI: 3. *Rum. Acetosa.*

VIII AND.

Populus.
Laurus.

IX AND.

Mercurialis.
Hydrocharis. *Morsus ranæ* D.

X AND.

Sassafras †.
Nyssa †. G. *Tupelo* Catb.
§. X: 3. *Cucub. Lychnis.*
§. ♂. 5. *Cann. Cannabina* T.

POL.

Papaya T. *
Aruncus. *Barba Capræ* T.
Kiggelaria †. *Arb. Ilicis folio* B.

MONAD.

Juniperus T.
Sabina Rp.
Taxus *.

SYNG.

Ruscus *.

POLYGAMIA.

Species Hybridæ.

MONŒCIA.

Veratrum.	VI: 3
Valantia A. *.	IV: 1
Holcus †.	III: 2
Sorghum M.	III: 2
Schœnanthum M.	III: 2
Halimus * Mg.	X: 2
Atriplex.	V: 2
Parietaria.	IV: 1
§. IV: 1. *Poterium* N: 2	

DIŒCIA.

Fraxinus T. Pn.	II. 1
Ornus Pn.	II. 1
Elichrysum.	T: M.
§. X. 5. *Sedum. Rhodia.*	

TRIŒCIA.

Empetrum.	III: 1

CRYPTOGAMIA.

Flores absconditi.

ARBORES.

Ficus. III: 1
Caprificus Pn.
Erinosyce Pn.

FILICES.

Equisetum.
Ophioglossum T.
Lunaria Rp.
Pteris. *Thilypteris* D.
Polypodium.
Lonchitis.
Hemionitis T.
Lingua Cervina T.
Adiantum.
Trichomanes.
Acrosticum †.
Muraria.

MUSCI.

Lycopodium D.
Selaginoides Rj.
Selago D.
Lycopodioides Rj.
Fontinalis D.
Sphagnum D.
Mnium D. *Muscoides* V.
Hypnum D.
Bryum D.
Polytrichum D.
Jungermannia. *Hepatica* M.
Lichenastrum D.
Marchantia. *Lichen* D.
Marsilea. *Lunularia* M.
Lichen. *Lichenoides* D.

ALGÆ.

Fucus.
Ulva Rj.
Hydrophace Bx.
Lemna. *Lenticula* M.
Lenticularia M.
Chara Rj. *Hippuris* D.
Conferva Rj.

FUNGI.

Agaricus D.
Amanita D.
Boletus D.
Hydna. *Erinaceus* D.
Merulius B. *Morchella* D.
Elvela. *Fungoides* D.
Peziza D. *Cyathoides* M.
Coniplea. *Lycoperdon* T.
Lycoperdastrum M.
Geaster M.
Carpobolus M.
Byssus Rj.
Nostoc V.

LITHOPHYTA.

Spongia.
Badiaga Bx.
Isis. *Keratophyton* B.
Tubipora. *Tubularia* T.
Cellepora †.
Millepora.
Madrepora.
Retipora.
Corallium.
Acetabulum.
Eschara.

BIBLIOGRAPHICAL NOTES.

XXIV.—Two Editions of Sitgreave's Report.

At least two editions were published of Captain L. Sitgreave's "Report of an Expedition down the Zuni and Colorado Rivers." Both editions were published in Washington by the Government, and both were authorized by the Senate.

The first was published in 1853 as Executive Document No. 53 of the Second Session of the Thirty-second Congress. Of this edition 2000 copies were printed in compliance with a resolution of the Senate, dated March 3, 1853. The publisher, according to the title-page, was "Robert Armstrong, public printer." The narrative of the expedition consists of the first 21 pages. The botanical report, by John Torrey, extends from page 155 to 178; the botanical illustrations, 21 in all, are lithographed by Ackerman, of New York. Two of the plates refer to plants not enumerated in the main text of the report, namely, pl. 2, *Vernonia arkansana*, and pl. 12, *Eriogonum umbellatum*, both Texas plants, prepared for another Government report which was never published. The plant shown in Plate 21, *Aplopappus Nuttallii*, although referred to in the text, is not given in the list of plates.

The second edition was published in 1854 as an unnumbered Executive Document of the First Session of the Thirty-third Congress. Of this edition 3000 copies were printed under order of May 17, 1854. The publisher was "Beverly Tucker, Senate printer." The text is the same as in the first edition, but has all been reset in slightly different type. The general report extends over 22 pages. The botanical report, however, covers exactly the same pages as in the other edition, and the text on each page is

precisely the same, except for the occasional running of a word or syllable forward or backward on corresponding lines—as, for example, the word "flowers" on page 155, which in the 1853 edition occurs on the fifth line from the bottom, in the 1854 edition on the fourth line from the bottom; and an occasional typographical error, such as *pavifolius* on page 158 of the 1854 edition, second line from the bottom, which in the 1853 edition reads correctly, *parvifolius*. The botanical plates are the same as in the 1853 edition, are also lithographed by Ackerman, and appear not to have been redrawn.

Apparently the edition of 1853 was used as copy in setting type for the edition of 1854, and was not submitted to the author for revision. The two therefore differ far less in their make-up than do most editions of these early botanical Government reports. Indeed, for purposes of reference the second is as good as the first, except that its title-page date is misleading.

F. V. Coville.
J. N. Rose.

SHORT NOTES.

Elymus arenarius in Sussex.—I have been asked by the Rev. E. N. Bloomfield, of Guestling, Sussex, to place on record the occurrence of the above-named grass in East Sussex. It was found this summer by Mr. L. B. Hall, who, noticing some of the spikes to be ergotized, picked one or two and sent a specimen to Mr. Bloomfield, not knowing the rarity of the plant in the South. He gathered it at Camber, near Rye. In a letter to Mr. Bloomfield he remarks: "There were, as far as I recollect, three or four very fine clumps, about two to four feet in diameter, or larger. There were no rubbish heaps, or any other indication of its being introduced. I saw about four spikes in flower, some of them very large." This brings it near the Kent coast, for which it is on record; but the authors of the *Flora of Kent* consider it requires confirmation, and in this I agree. *E. arenarius* is now on record for Essex !, Sussex !, *Hants, Dorset,† N. Somerset.‡ The Devon record has not been confirmed, though the plant has been specially sought, in the habitat given, by the Rev. Moyle Rogers. On the west coast it occurs in Merioneth, F. C. Roper, 1892; Carnarvon, "Gibson MS." (Top. Bot.). There is a specimen labelled "Y Mawn," in Hugh Davies's collection, now in the British Museum; but it is not entered for either county in Mr. J. E. Griffiths's *Flora of Anglesea and Carnarvonshire*. On the French coast it occurs in Normandy (La Manche), but is absent from the *Flore de l'Ouest* of Messrs. Lloyd and Foucaud (1886). In Belgium, Crépin records it as "assez rare."—Arthur Bennett.

* Journ. Bot. 1886, p. 284; by error as "S. Wilts."
† Sp. c. p. 312, 1888.
‡ Record Club Report for 1883, p. 26 (1884).

IMPATIENS GLANDULIFERA Royle, (pp. 50, 87, 278).—I believe that this plant is frequently grown in cottage and suburban gardens, and remember cultivating it myself at Leicester forty-five years ago. Also I have had it here (Balham) for several seasons recently, unattractive though it is. In August, 1898, there were a number of plants in the garden of a cottage on Weydown Common (Surrey), near Haslemere, and others evidently self-sown had sprung up on the roadside bank outside of the garden. In the same month of 1899 I was frequently at the spot, but saw no trace of any plants. In so sheltered a spot as Weydown Common the species might easily establish itself.—WILLIAM WHITWELL.

WINTER BUDS IN ZANNICHELLIA.—In August of this year, when collecting *Zannichellia polycarpa* Nolte, which grows in great abundance in the drains of brackish water near Belfast Harbour on the Co. Down side, I found some tuber-like bodies among the tangled masses of weed giving rise to young plants. They are irregular in size and shape, about the size of a lentil-seed, and are probably gemmæ or winter buds. Mr. A. Bennett has kindly looked up the literature of the subject and has also written to enquire of Dr. Ascherson, and cannot find that they have been noticed before. The young plants produced were from an inch to two inches long. —C. H. WADDELL.

ARUM ITALICUM IN DORSET.—I have delayed noticing Mr. Linton's doubts as to the claim of *Arum italicum* (referred to in your notice (p. 361) of his Bournemouth Flora) to be a Dorset plant, until the October number of the Journal had appeared. I felt sure my letters would have been acknowledged which plainly substantiated the localities claimed for it in my *Flora of Dorset*, questioned by Mr. Linton on the negative evidence of himself and Mr. R. P. Murray, on the insufficient ground that after a "careful search" they "could only find *A. maculatum* among the bushes which grow under the shelter of the walls in the locality indicated." Two localities are specified in the *Flora of Dorset*—Dancing Ledge and Tilly Whim, a mile and a half distant: Mr. Linton makes short work of these by one sweep of his pen. "Obviously," he says, "they are the same, and not two distinct ones." Why obviously? The station I have given is, "thickets under walls east of Dancing Ledge," or, to speak exactly, a few yards only east of that romantic spot; the other—Tilly Whim—is, as I have said above, a mile and a half distant. I sent Mr. Linton two specimens which I had found myself, one at Dancing Ledge, the other at Round Down, where I found it after the issue of the second edition of my *Flora of Dorset*, and I have no hesitation in saying that both are undoubted *Arum italicum*. On returning them to me he asked what characters I relied upon most for separating them. Among other differences I showed that the spadix of *A. italicum* is short and slender, colour uniformly yellow, and was almost concealed within the spathe; that the lower lobes of the triangular-shaped divaricate leaves are long and sharply pointed, resembling *Sagittaria sagittifolia*; that they appear in the autumn and not in

the following spring, as is the case with *Arum italicum*, whose spadix is much taller and more robust and conspicuous, with the expanded scape; although sometimes yellowish, it is invariably accompanied with a decided reddish tinge. The lower lobes of the triangular-shaped leaves are rounded—not pointed—and only partially decurrent.—J. C. Mansel-Pleydell.

[The excellent specimens collected by Messrs. Ridley and Fawcett at Tilly Whim, and placed by them in the National Herbarium, leave no doubt as to the identity of their plant with *A. italicum*.—Ed. Journ. Bot.]

Cyperus fuscus in N. Somerset. — In September last I found *Cyperus fuscus* by a boggy ditch near Clevedon, thus adding a fifth to the counties—Middlesex, Surrey, Dorset, S. Hants—already on record for the plant.—S. J. Coley.

Jubula Hutchinsiæ in Devon.—This summer I came across *Jubula Hutchinsiæ* growing freely on a shady bank in a wood at Wooda Bay, hanging down, and with the water from a small stream gently trickling over it.—T. H. Russell.

Sphærotheca Mors-uvæ Berkl. & Curt. in Ireland.—This, the "gooseberry fungus," appeared last spring at Whitehall, Broughshane, Co. Antrim. Mr. E. S. Salmon tells me that this is its first appearance in Europe.—S. Arthur Brenan.

NOTICES OF BOOKS.

An Introduction to Vegetable Physiology. By J. Reynolds Green, Sc.D., F.R.S. 8vo, pp. xx, 459, with 184 figs. in the text. London: Churchill. 1900. Price 10s. 6d.

This book will be heartily welcomed by botanists. As the author remarks in his preface, among the many recent additions to our elementary text-books, there is not one which deals solely or at any length with the subject of plant physiology. In the generally admirable manual by Strasburger and his colleagues, a somewhat belated translation of which appeared in English, the section on physiology is the least satisfactory, and in some points sadly incomplete, and even misleading. The few chapters devoted to this phase of the subject in Vines's *Students' Text-book* are excellent as far as they go, but they do not go nearly far enough for the student who is working for one of the many higher examinations. Professor Green has endeavoured to fill the gap between these elementary treatments and the fuller discussions of the subject which may be found in the more advanced text-books. His aim has been "to present the plant as a living organism, endowed with particular properties and powers, realizing certain needs, and meeting definite dangers," and "to show it to be properly equipped to encounter such adverse conditions, and to avail itself of all the advantages presented to it by its environment." The method adopted is excellent; the inclusion of a good deal of structural

matter serving to elucidate both structure and functions, and to emphasize that close relation between the two which cannot be too much insisted upon.

The author has also endeavoured to impress upon the student the points of resemblance between animal and plant life resulting from the identity of all living substance. While, for instance, it has long been recognized that respiration in plants and animals is one and the same process, a vivid contrast has generally been drawn between methods of nutrition. The animal feeds on organic, but the plant is supposed to feed on inorganic substances of great simplicity, namely, carbon dioxide absorbed from the air by green leaves in sunlight, and water containing mineral matter in solution by the root system from the soil. In chapter ix. the author presents us with a clear and convincing statement of the actual facts of the case, pointing out the confusion that has arisen between "food" as we understand it in the animal world, or in the case of the nutrition of protoplasm generally, and the raw food materials which the green plant can absorb from without under certain conditions. By setting apart as a distinct process this absorption of simple inorganic matter from outside, the student is made to see clearly that the nourishment of the protoplasm of all plants, whether containing chorophyll or living the life of a parasite or saprophyte, is on precisely the same lines, the foods being substances of a complex nature, mainly proteids, carbohydrates, fats, or oils. In chapter xi. an excellent account is given of the work of the chlorophyll apparatus and the first visible products of its operations.

There are in all twenty-seven chapters. The earlier deal with the general structure and differentiation of the plant-body, after which the functions of transpiration, respiration, nutrition, and its subsidiary processes are considered, and in the later chapters the expenditure of energy, and the relation of the plant to its environment as expressed by general form and response to external stimuli. The last two chapters are on Reproduction.

The book is well written and very fairly illustrated; many of the figures seem to be original. It is very heavy for its size, but the widely ranging specific gravity of paper is a mystery into which we cannot enter here. Professor Green is to be congratulated on having made a valuable addition to the teaching literature of botany.

A. B. R.

Eléments de Paléobotanique. Par R. Zeiller. Paris: Carre et Naud. 1900. Pp. 421.

Studies in Fossil Botany. By Dukinfield Henry Scott, Ph.D., F.R.S., &c. London: A. & C. Black. 1900. Pp. 533. Price 7s. 6d.

M. Zeiller has rendered an important service to Palæobotany by this valuable introduction. It presents a systematic view of the various types of plants which have been discovered in a fossil state. Prefixed to this view are two chapters, one on the various

ways in which fossil plants have been preserved, and the other on the classification and nomenclature of fossil plants, a department of palæontology which is in a very unsatisfactory state. The systematic view is followed by an exhibition of the chief characteristics of the successive floras of the earth, and a consideration of the evidence afforded in the study of these floras for the genetic evolution of the vegetable kingdom. M. Zeiller believes that the general tendency of the successive floras tells in favour of progressive evolution. But the earlier forms very rarely throw any light on the origin of generic types, though he thinks *Danæopsis* of the Trias may be the parent of *Danæa* of the Lias. In the case of allied species he sees no indication of a gradual change into neighbouring forms; the specific peculiarities suddenly appear, and remain fixed throughout the existence of the species. He therefore concludes that evolution was not gradual and imperceptible, but so sudden and rapid that we are unable to detect it. The systematic view, which forms the bulk of the volume, is carefully done. In the descriptions the author does not deal with anything lower than genera, but these are clearly described and well illustrated.

Dr. Scott's volume consists of a series of studies of the vascular cryptogams and gymnosperms, and incorporates much of the author's original work. It will be valuable to all students who direct their attention to fossil plants. The work is clearly and concisely written, and is fully illustrated with drawings of external forms and with minute histological details which have been made possible for text-books by the recently discovered processes of reproduction. It would not be possible to reproduce a portion of the work which would give a fair notion of its value; it is a great gain to botanists to have in our language so admirable a presentation of the important facts connected with the structure and organization of the palæozoic plants.

Dr. Scott concludes with an inquiry into the relation of the subjects of his study to the theory of the genetic evolution of the vegetable kingdom. While accepting, like M. Zeiller, the theory, he presents some of the many difficulties with which the story of past life on the globe abounds. In speaking of the late appearance of Angiosperms, he says that the facts at present known throw no light on the origin of this subkingdom, or on its relation to the Gymnosperms. Of the Pteridophytes, to which his work is chiefly devoted, he says that palæontology can at present throw no light on their ancestry. They are supposed by evolutionists to be derived from the Bryophytes, but Dr. Scott says emphatically that this theory receives no trace of support from fossil evidence, whatever may be the verdict of comparative morphology, and he concludes that the history of these two groups of plants may fairly be regarded as favouring the view that the course of evolution of the Vascular Cryptogams was altogether independent of that of the Bryophytes. It is obvious that a vivid imagination must be at the command of any one who endeavours to discover, from the known facts of fossil botany, the genetic history of the vegetable kingdom. But, leaving these speculative regions, as Dr. Scott calls them, we

again commend this volume, which may be accepted as a trustworthy guide to the student of the past history of the Pteridophytes and Gymnosperms.

W. C.

Les espèces du genre Matthiola. Par Pascal Conti. Préface par R. Chodat. (Mémoires de l'Herbier Boissier, No. 18, pp. 1–86, 20 Aug. 1900.)

Pascal Conti, who died on Aug. 2nd, 1898, at the age of twenty-four, was first a pupil and then an assistant to Prof. Chodat in the Botanical Laboratory of the University of Geneva. The work before us is of considerable merit, and shows a wide knowledge of botanical literature, and we regret that a career so promising has been so abruptly terminated. The species of *Mathiola*, to adopt the original spelling, may be grouped in two categories—the sand-loving species, of which European examples are *M. sinuata* and *M. tricuspidata;* and the rock species, represented by *M. tristis* and many others. *Mathiola* is primarily a Mediterranean genus, being limited to the regions which border the great Aralo-Mediterranean depression. Few species are found beyond these limits, the only examples the author quotes being *M. elliptica* R. Br. from Abyssinia, *M. torulosa* from the Cape, and *M. songarica*.

For the purposes of the systematic arrangement of species in a lineal series the author proposes two divisions—"Série irano-thibétaine" and "Série sud-iranienne." These divisions are very unequal in numerical strength, as the former includes only *M. revoluta* Bunge and *M. khorassanica* Bunge; the latter, the remaining thirty-two species. In the second division are fourteen groups, including from one to five species each. These depend partly on the duration of the plant, partly on the structure of the more important organs, such as leaves, flowers, and fruit. A point upon which the author lays considerable stress is the structure of the nectary—for instance, in *M. elliptica* R. Br. the nectaries are completely independent; in *M. dumulosa* Boiss. & Bulse and *M. flavida* Boiss. they anastomose strongly above and below. The diagnostic characters of the groups are not sufficiently contrasted one with the other; thus, while in certain groups, as has just been said, stress is laid on the structure of the nectary, in many the description of this organ is omitted; again, in group C, the group of *M. elliptica* R. Br., we are told the seeds are very small and without wings; while in groups A, B, D, E, we are entirely left in ignorance on this point.

M. Conti takes a somewhat comprehensive view of species, and frequently unites plants which have been kept distinct by previous authors: thus he combines *M. rupestris* DC. and *M. undulata* Tineo, which are retained as distinct by Gussone and Lojacono.

Previous to the appearance of this monograph considerable confusion existed in regard to *M. odoratissima* R. Br. Why this should be the case it is difficult to understand, as an excellent series of *Cheiranthus odoratissimus* Pallas (the plant on which this species is founded) are in the National Herbarium. A large number

of plants, collected by English collectors in Kashmir, have been referred here which should have been placed under a very different species—*M. reroluta* Bunge. The area of distribution of *M. odoratissima* R. Br. is Crimea, Caucasus, and the valley of Harirond, in Afghanistan, where it was collected by Dr. Aitchison; the type has runcinate pinnatisect leaves with lobes irregularly sinuate or dentate, while in *M. reroluta* they are oval, oblong-spathulate or rarely oblanceolate, grossly dentate or crenulate-incised.

The author gives no list of excluded species, and we are unable to find that he anywhere in the work deals with the three plants Sprengel describes in his *Systema*, ii. p. 897 (1825)—i. e. *M. nana*, *M. macropetala*, and *M. lacera*. *M. macropetala* he would doubtless refer to *M. oxyceras* DC., as it is stated to be synonymous with *M. longipetala* DC. The following species seem to be omitted:—

M. nudicaulis Trautv. in Act. Hort. Petrop. i. (1871), p. 51.

M. runcinata Regel in Bull. Soc. Nat. Mosc. xliii. (1870), i. p. 254.

M. Telum Pomel, Nouv. Mat. Fl. Atl. p. 372.

M. dimolehensis Bak. fil. in Journ. Bot. 1898, p. 2, a plant allied to *M. elliptica* R. Brown, but differing in length of siliquæ, pubescence of calyx, etc.

M. Smithii Bak. fil. in Journ. Bot. 1896, p. 50, a species intermediate between the genera *Mathiola* and *Morettia*.

M. Bolleana Webb ex Christ in Engler, Jahrb. ix. p. 88, from the island of Fuertaventura.

E. G. B.

The Gaelic Names of Plants, Scottish, Irish, and Manx, collected and arranged in scientific order, with notes on their etymology, uses, plant superstitions, etc., among the Celts, with copious Gaelic, English, and scientific indices. By John Cameron. New and revised edition. Glasgow: John Mackay, 1900. 8vo, cloth, pp. xv, 160, portr. Price 7s. 6d.

We reviewed the first edition of this little book on its appearance in 1883 (p. 187), and we are glad to note that the suggestion we then made as to the inclusion of the Gaelic names published in Threlkeld's *Synopsis Stirpium* has been adopted, although we find no indication that Keogh's *Botanologia*, which would add many names to Mr. Cameron's list, has been consulted.

The revision of this edition seems to have been very thorough, but it would, we think, have been well to call special attention to some of the numerous and important corrections (which might rather be termed contradictions) of the first issue. It appears to us that these affect not only spelling and interpretation, but even the accuracy of the names themselves. For example, opening at random, we find on p. 10, under *Drosera*, "*lus an Earnaich*; '*Earnach*' was the name given to a distemper among cattle, caused by eating a poisonous herb—some say the Sundew." This, in view of English names and traditions concerning the plant, seems a likely explanation; but in the first edition (p. 8) it is called "*lus na fearnaich*, the plant with shields (its leaves have some resemblance

to shields)." There is nothing to show whether the revised rendering is a correction or an additional name, though the omission of the earlier title renders it probable that a correction is intended. On the same page we have a name for *Saponaria* which finds no counterpart in the second edition.

It is much to be regretted that Mr. Cameron did not entrust his proofs to some botanical friend for correction. The new edition is far more prolific than its predecessor in misspellings; such slips as "Drosero," "Eunoymus," "Madragora," "palludocis" (for paludosus), "Hedgra" (for Hedera) abound. *Juglans* is placed in Rhamnaceæ, and *Daphne* in Lauraceæ; "Arenaria alsine"—a name new to science—is given in both editions as an equivalent for "sandwort." The author does not enlighten us as to the source of his Gaelic names, nor does he tell us which are derived from books and which are in actual use; a considerable number are evidently mere translations. Mr. Cameron has given us a great deal of interesting and out-of-the-way information, and we can well believe that his book has "occupied his spare time for many years"; but it falls short of being thoroughly satisfactory.

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*ARTICLES IN JOURNALS.**

Annals of Botany (Sept.).—R. A. Harper, 'Sexual reproduction in *Pyronema confluens* amd the morphology of the Ascocarp' (3 pl.). — T. Ito, 'Ito Keisuké' (portr.). — D. H. Scott & T. G. Hill, 'Structure of *Isoetes Hystrix*' (2 pl.). — L. A. Boodle, 'Anatomy of *Hymenophyllaceæ*' (3 pl.).— R. F. Shore, 'Structure of stem of *Angiopteris*' (2 pl.). — E. N. Thomas, 'Double fertilization in *Caltha palustris*' (1 pl.).

Bot. Centralblatt (Nos. 40–43).—L. Hering, 'Zur Anatomie der monopodialen Orchideen' (3 pl.). — (No. 41).— K. Kroemer, 'Das angebliche Vorkommen von violetten Chromatophoren.'—(No. 42). F. Hildebrand, 'Ueber Bastardirungsexperimente zwischen einigen *Hepatica*-Arten.'—(No. 43). C. Correns, 'Ueber Levkojenbastarde.'

Bot. Notiser (häft. 4). — K. Bohlin, 'Ett exempel på ömeesidig vikariering mellan en fjäll-och en Kust form' (*Woodsia*, &c.).— E. Nyman, 'Botaniska excursioner på Java.'

Bot. Gazette (15 Sept.). — A. A. Lawson, 'Multipolar spindle in *Gladiolus*' (1 pl.).—H. G. Timberlake, 'Cell plate in higher plants' (2 pl.). — A. Rimbach, 'Perennial herbs.' — A. Nelson, Rocky Mountain plants.

Bot. Zeitung (1 Oct.).—H. Graf zu Solms-Laubach, 'Cruciferenstudien' (1 pl.).

Bull. Torrey Bot. Club (Sept.: July & Aug. not to hand).—

* The dates assigned to the numbers are those which appear on their covers or title-pages, but it must not always be inferred that this is the actual date of publication.

E. J. Durand, 'Classification of the fleshy *Pezizineæ*' (6 pl.)—E. J. Hill, '*Celtis pumila*' (1 pl.). — G. E. Osterhout, 'New plants from Colorado.'

Gardeners' Chronicle (29 Sept.). — C. T. Druery, 'Latent variability' (in ferns). — (6 Oct.). *Spiræa Aitchisoni* Hemsl., sp. n. (fig. 75).—(20 Oct.). *Begonia Augustini* Hemsl., sp. n.

Journal de Botanique ("Mai": received 1 Oct.).—P. van Tieghem, *Erythrospermum*. — G. Rouy, 'Rosiers hybrides européens.'—F. Guégnen, 'Tissu collecteur et conducteur des Phanérogames.'

Mém. de l'Herb. Boissier (25 Sept.). — M. Gottschall, 'Blatt der Melastomaceen (*Miconiæ*)' (3 pl.).—(15 Oct.) H. Schinz, &c., 'Znr Kenntnis der africanischen Flora' (*Dintera*, Stapf. gen. nov. Scrophulariaceæ : 2 pl.).—A. Usteri, 'Zur Kenntnis der Platanen' (1 pl.).

Nuov. Giorn. Bot. Ital. (Oct.).—A. Colozza, 'Contribuzione all' algologia romana.' — T. Ferraris, 'Contribuzione alla Flora del Piemonte.'—C. Papi, 'Richerche sull' *Juniperus drupacea*.'

Oesterr. Bot. Zeitschrift (Sept.).—R. v. Wettstein, 'Botanischen Nomenclatur.' — A. v. Degen, '*Bornmullera Dieckii*, sp. n.' — A. Peter, 'Ueber hoch zusammengesetzte Stärkekörner in Endosperm von Weizen.' — F. Bubák, 'Aussereuropäische Pilze' (1 pl.).—L. Celakovský, 'Sporangien von *Ginkgo*.' — (Sept. & Oct.). J. Freyn, 'Flora von Steiermark (*Rubus*).' — A. v. Hayek, 'Eine biologische bemerkenswerthe Eigenschaft alpiner Compositen.'—(Oct.). E. Palla, 'Zur Kenntniss der *Pilobolus*-Arten' (1 pl.).—R. v. Wettstein, *Euphrasia Cheesemani*, sp. n.

Rhodora (Oct.).—M. L. Fernald, '*Rubus Idæus* in America.'

BOOK-NOTES, NEWS, &c.

The first of the series of Monographs which Prof. Engler has planned as an amplification of the indispensable *Pflanzenfamilien* deals with the *Musaceæ*; these have been elaborated by Prof. Schumann. From the prospectus we learn that the work—which is entitled *Das Pflanzenreich*—will consist of a complete series of monographs, dealing with each family of the vegetable kingdom, and doing for species what the earlier undertaking did for genera. The task is a gigantic one, and will entail an enormous amount of work, while its usefulness to systematic botanists cannot be overestimated. We trust the rumour is incorrect which states that the whole is to be undertaken by botanists of German nationality; in a work of this kind the assistance of the best men should be obtained, and it is no disparagement to Germany to say that it has not a monopoly of competent botanists. Judging from a cursory glance at Prof. Schumann's monograph, the scheme justifies the highest expectations. We would suggest, however, that each monograph

should be fully dated in a way which would necessitate the preservation of the date: "1900" on wrapper is not sufficient. We could have dispensed with the illustrations, especially some familiar blocks showing habit which occupy a whole page.

The *Moss Exchange Club Reports* for 1899 and 1900 have recently been issued in the form of a pamphlet of sixty-three pages. From these it is evident that the Club is steadily increasing in activity and in usefulness. The number of specimens distributed during the two years was about 3500 mosses and 1700 hepatics, a total of some 5200 plants. An effort has been made during the last year to check the naming of the specimens, by submitting these to specialists in the particular groups to which the plant belongs; and it is hoped that by so doing the weakest point in the Club's work during previous years has been remedied. According to the report, the condition of the specimens and the quantity of each sent in, as also the method of packing, show a decided improvement on previous years. The report contains numerous critical notes from the Club "Note Book," as well as, apparently, a complete list of all the species with localities distributed. Among the more interesting plants which have been commented upon by various members are—*Dicranella Schreberi* var. *elata*, *Dicranodontium longirostre* var. *alpinum*, *Grimmia arenaria*, *Weisia crispata*, *Weisia rupestris* var. *intermedia*, *Webera annotina*, *Amblystegium Serphus* var. *depauperata*, *Hypnum hamulosum* and *H. callichroum*, and *Fissidens tamarindifolius*. The Club now contains some thirty-four members, which is as many as can conveniently be worked; but a beginner's section has just been commenced, which it is hoped will act as a feeder to the parent society, will encourage beginners, and help to carry them over the initial difficulties. In this section specimens to be named may be sent at any time to the Secretary, and named plants will be sent to the members four times a year, the first distribution being on Jan. 1st, 1901. The Secretary is Mr. E. C. Horrell, 49, Danby Street, Peckham, S.E., from whom copies of the rules, &c., can be procured. In the present reports we notice again the severe indifference with which bryologists regard certain of the laws of nomenclature, and particularly that on the abbreviation of authors' names; for example, Who is intended by the abbreviation Ldb.? Is it Ledebour, Lindberg, Lindeberg, Lindenberg, or who is it? Who are intended by the mysterious combinations of consonants Schp., Schpr., Spr., Schwg., Schwgr.? If a name requires abbreviation at all (a two-syllable word of only five letters would hardly require to be shortened), the rule to be observed is "the first syllable and the first letter of the following one, or the first two letters, if they are both consonants"—e. g. *Schimp.* for Schimper; *Rich.* for Richard.

The Messrs. Groves have issued the second fasciculus of their admirable *Characeæ Britannicæ Exsiccatæ*, which contains thirty numbers, representing the following species:—*Chara fragilis* Desv., *C. aspera* Willd., *C. aspera* subsp. *desmacantha*, *C. baltica* Bruzel var. *affinis*, *C. contraria* Kuetz., *C. tomentosa* L., *C. hispida* × *contraria*, *C. hispida* L., *C. Braunii* Gmel., *Lamprothamnus alopecuroides*

Braun, *Tolypella glomerata* Leonh., *T. prolifera* Leonh., *T. intricata* Leonh., *Nitella hyalina* Ag., *N. Nordstedtiana* H. & J. G., *N. tenuissima* Kuetz., *N. gracilis* Ag., *N. mucronata* Miquel, *N. translucens* Ag., *N. flexilis* Ag., *N. opaca* Ag. The two parts, which cost a guinea each, comprise all but one of the *Characeæ* known to occur in the British Isles. A few copies of the first fasciculus are still to be obtained. Perhaps Mr. Bullock-Webster's beautiful specimens of *Nitella hyalina*, the latest addition to our *Chara*-flora, are the most noteworthy feature of the present fasciculus.

We note that Mr. Hemsley, in his somewhat disappointing notice in *Nature* (for Oct. 4) of the *Illustrations to the Botany of Cook's Voyage*, refers to the printing of "Endeavour's" rather than "Endeavour" River as a "palpable error." The names of places are printed as Banks and Solander wrote them; and "Endeavour's River" is the form they employ in the herbarium, the MSS., and the drawings. Sir Joseph Hooker, indeed, in his edition of Banks's Journal, uses "Endeavour River"; but in so doing he departs from the transcript of the original from which his copy was taken. It is true that in Cook's Journal (edited by Captain Wharton) Cook speaks of naming it Endeavour River, but in the reproduction of Cook's "original chart," which accompanies the Journal, it appears as "Endeavour's River." The matter is of very slight importance, but it seems hardly fair to single out as a "palpable error" a name which was employed, though not exclusively, by Cook, and uniformly adopted by his fellow-voyagers. Mr. Hemsley says that Mr. Britten has been "permitted to exercise [his] will in this national publication" in the matter of nomenclature; but the rules followed are those which govern the publications of the Department of Botany. We note that Mr. Hemsley implies—unless his phrase be a mere *façon de parler*—a knowledge of the reasons which prevented the publication of the work by Banks himself: "this is not the place," he says, "to enter into the causes of the cessation." The matter is of so much interest that it is to be hoped that Mr. Hemsley may speedily find a suitable "place" for the publication of any explanation he may have discovered.

The second part of M. E. de Halácsy's *Conspectus Floræ Græcæ*, the first instalment of which we noticed at p. 234, has appeared, bringing the enumeration down to *Crassulaceæ*. We regret that it has not been found possible to adopt our suggestion of adding to the heading of each page the name of the genus of which it treats: this would greatly increase the usefulness of the work.

The twenty-ninth Annual Report (for 1899–1900) of the Chester Society of Natural Science contains a list of additions and notes by Miss Cummings, Miss Payne, and Miss A. Payne to the flora of Chester, and a list of the fungi of the district by Messrs. J. & A. H. Thompson—the latter list is disfigured by the prominence given to what are absurdly called "English names." The authors have placed a book containing a detailed account and a water-colour drawing of almost every species in the library of the Society.

Mr. Frederic Stratton sends us a pretty little oblong volume containing a chatty account of the *Wild Flowers of the Isle of Wight*, which we agree with him in thinking may be useful to visitors. The most interesting feature in it to botanists is the author's announcement that he has "still a hope of publishing a Flora of the Island," for which he will be glad of information, especially as to Brambles and Roses. If it were not for the capital map, the twenty pages of which the booklet consists would seem somewhat dear at 1s. net: it is published at the County Press, Newport.

Mr. C. R. P. Andrews, who has contributed interesting notes on Channel Islands plants to our pages, is leaving England for Western Australia, where he has been appointed first Principal of the new Government Training College at Perth. Mr. Andrews, who is one of the not too numerous recent accessions to the number of British botanists, will find a wide field for botanical work in his new surroundings.

We regret to record the sudden death, from heart affection, of Edward George, which took place at his house at Forest Hill on the 10th of October. His retiring disposition made him little known even to the students of those groups of plants to which he devoted himself; but the few who knew him valued him as a true friend. Mr. George first devoted himself to mosses, of which he made large and valuable collections. For many years he gave himself wholly to the study of algæ, and spent his holidays in localities where he could study and gather these plants. He has left very extensive collections, all beautifully laid out and carefully localized. This year he twice visited the Scilly Islands, first in the spring and then in the late summer, and some notion of his sharp-eyed, intelligent observation at seventy years of age may be gathered from Mr. Batters's memoir on British Marine Algæ in the last number of this Journal, p. 272, &c. In recording three species new to the algal flora of Britain, one the type of a new genus, which were sent to him by Mr. George, Mr. Batters says:—"I have dedicated the species (*Rhodophysema Georgii*) to my friend Mr. George, an indefatigable collector, to whom, as this paper proves, I am deeply indebted not only for beautiful specimens of the present plant, but for other rare seaweeds from the Scilly Islands and elsewhere. Mr. George's fine collection of marine algæ, with its sets of magnificent specimens, the reward of assiduous collecting continued for many successive years, is but little known to botanists; but it is in vain that I have repeatedly urged my friend to publish his notes."

Dr. K. Schumann, of the Botanisches Museum, Berlin, will be glad if authors will send him a copy of their publications, and especially reprints of botanical articles published in the Proceedings, Transactions, and other Journals of learned societies, in order that such literature may be reviewed promptly for *Just's Botanischer Jahresbericht*.

We are sorry to find that Mr. J. M. B. Taylor is not pleased with the brief notice of his *Handbook of Plant Collecting* published on p. 408. It seems best to let Mr. Taylor state his objections in his own way, so we print his letter *verbatim et literatim*;—"It cannot be hidden from any one who cares to look at your Review that it is largely tinged with an *element* of *spleen*. You take a quotation from the book without showing its connection, yet with that you can't bring out what you assert. I defy you to prove that any of the space in the book is taken up "with useless or unnecessary remarks." The fact that you say so proves that you have no experience in collecting or drying plants. So far as Reviews go you stand alone in this matter, and it is clear that you labour under *spleenic error*. As to the illustrations they do occupy too much space for the size of the book, that is due to an error of the Publisher in making them too big. For you to say that the book would do without the illustrations, it would be as near the mark to say that you would be improved without your eyes, or any of your other five senses. As to the literary style of the book, those who live in glass houses should not throw stones. I have your *European Ferns*, and no doubt you will look on your literary style as a model. Let me tell you that your style is stiff in the extreme—and is that which will not suit this part of the country. The language you make use of to describe the ferns is that which turns many would be readers away from the study of such beautiful objects as the ferns. My little book can only be looked upon as a labour of love, but with your *European Ferns* it is different—you have something of a commercial transaction for your pocket. Now with my little book it is a guide to what it professes, and its teachings are free from error—and gives to the world what is new. This cannot be said of your *European Ferns*: it contains errors, and as long as your book is in use you are a Manufacturer of errors—errors for which one in your position is *responsible*."

The latest contribution to newspaper botany comes from a recent number of *Pearson's Weekly*. It appears under the heading "Questions Worth Answering," as to which we are informed that "half-a-crown is paid for every question used, and replies at the rate of two guineas a column":—"5223. Why have so Many Plants Leaves with Notched Edges?—A few years ago Professor Rudolph, in a series of lectures on 'The Great Wonders Around Us,' propounded a theory of the function of the finely serrated edges of certain leaves. He considered that these points and edges served to permit the escape of electricity, which might otherwise accumulate on the surface of the earth in dangerous quantities, and give rise to ascending lightning-strokes. The very same points and edges quietly convey away the electricity from the atmosphere and thus to a great extent disarm the tempests. Professor Rudolph supported his theory by pointing out that the highest trees, such as pines, have the most pointed leaves."

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JAMES BRITTEN, K.S.G., F.L.S.

SENIOR ASSISTANT, DEPARTMENT OF BOTANY, BRITISH MUSEUM (NATURAL HISTORY)

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A Delamerea pr[illegible] *S. Moore*
B. Nicolasia heterophylla *S. Moo[illegible]*

ALABASTRA DIVERSA.—Part VII.

By Spencer Le M. Moore, F.L.S.

(Plate 416.)

(Continued from p. 207.)

Delamerea,

Compositarum e tribu *Inuloidearum* genus novum (tab. 416 A).

Capitula heterogama, disciformia, multifloscula, flosculis exterioribus fœmineis 2–3-serialibus, reliquis bisexualibus, omnibus verisimiliter fertilibus. Involucri parvi campanulati phylla pauciserialia, imbricata, intima angustiora et longiora, omnia membranaceo-crustacea. Receptaculum planum, nudum. Flosculorum fœm. corollæ angustæ, stylo suo subæquilongæ, apice æqualiter vel inæqualiter 4–5-fidæ; flosculorum hermaph. corollæ tubuloso-campanulatæ, apice 5-lobæ. Antheræ lanceolato-apiculatæ, basi breviter caudatæ, caudis connatis. Flosculorum hermaph. styli filiformes, papillosi, ramis linearibus, apice leviter rotundatis. Achænia parva, compressa, flosculorum fœm. calva, hermaph. setis 3–5 caducis se ipsa longe excedentibus coronata.—Suffrutex parvus, procumbens, villosulus. Folia parva, alterna, inciso-serrata. Capitula parvula, solitaria, ramulos breves coronantia. Achænia pilosa.

Delamerea procumbens, sp. unica. Ramis ascendentibus sat brevibus raro ramulosis albo-villosulis demum pubescentibus, foliis sessilibus late ovato-spathulatis obtusissimis dimidio superiore inciso-serratis inferiore integerrimis albo-villosulis, involucri circa 4-serialis phyllis exterioribus ovatis obtusis intimis lanceolatis acuminatis, flosculis involucrum subæquantibus.

Hab. British East Africa, near Lake Marsabit, 1898; *Lord Delamere* (Herb. Mus. Brit.).

Caulis puberulus, in longitudinem eximie striatus, 0·3 cm. diam. Rami raro 10·0 cm. attingentes, modici circa 8·0 cm. long., graciles. Folia plerumque 0·6–1·0 cm. long. et circa 0·5 cm. lat. Involucri puberuli 0·6 cm. long et 0·5 cm. lat. phylla exteriora vix 0·4 cm. long., 0·2 cm. lat., ciliolata; intima 0·55 cm. long., 0·15 cm. lat. Flosculorum fœm. corollæ 0·35 cm. long., 0·05 cm. lat.; flosculorum hermaph. vix 0·5 cm. long., sub limbo 0·12 cm. lat. Androecium exsertum. Stylorum rami 0·06 cm. long. Achænia (nondum matura) 0·13 cm. long.; pappi setæ 0·4 cm. long., ima basi dilatatæ.

The affinity of this little plant is clearly with *Pluchea* and its allies, and among them it certainly approaches nearest to the small group of genera, including *Epaltes* and *Denekia*, which have only a few setæ to the pappus, if any at all. Of these *Denekia* is the only one with which comparison is necessary. But the species of *Denekia* have corymbose capitula, bifid outer florets, and inner florets with exceedingly short style-arms; moreover, though the outer florets resemble those of *Delamerea* in having no pappus, the pappus of the inner florets takes the form of either one or two setæ with strongly

penicillate tips. On cursory inspection one might suppose the new plant to be a *Grangea*, which in general appearance it greatly resembles, but dissection reveals important structural differences. Its place would seem to be next to *Denekia*.

Nicolasia,

Compositarum e tribu *Inuloidearum* genus novum (tab. 416 B).

Capitula heterogama, disciformia, multiflosculosa, flosculis serierum exteriorum fœmineis, interiorum hermaphroditis, omnibus fertilibus. Involucri late campanulati phylla pauciseriata, imbricata, angusta, membranacea, extima quam reliqua breviora. Receptaculum planum, nudum. Flosculorum fœm. corollæ filiformes, stylo suo breviores, apice minute denticulatæ; flosculorum hermaph. tubulosæ, apice 5-fidæ. Antheræ breviter apiculatæ, basi caudatæ, caudis sejunctis. Flosculorum hermaph. styli filiformes hirtelli, indivisi. Achænia parva, compressa. Omnium achæniorum pappi setæ 3, attenuatæ, caducissimæ.—Suffrutices humiles. Folia alterna, integra vel denticulata, membranacea, ramorum florigerorum imminuta. Capitula parva, ad apicem ramorum solitaria vel pauca.

This appears to be a well-marked genus, and one near to that already described in this memoir. In many respects it resembles *Pluchea*, but the habit, the free tails to the anthers, the compressed achenes, and, above all, the pappus with its three caducous setæ, furnish good points of distinction. Technically, the affinity is closer with *Epaltes*, *Denekia*, and *Delamerea*; but, among other characters, the absence of a distinct pappus from the achenes of *Epaltes* and from the circumferential ones of *Denekia* and *Delamerea*, and the different pappus of the interior achenes of the two latter genera, furnish ample grounds for establishing this as a new genus.

Specierum Clavis.

Puberula. Folia juniora maxime abbreviata et ovata. Capitula subsessilia. Involucri phylla lanceolata, spinuloso-acuminata . .	1. *N. heterophylla.*
Albo-pubescens. Folia juniora oblonga. Capitula pedunculata. Involucri phylla linearia, obtusiuscula	2. *N. pedunculata.*

Nicolasia heterophylla, sp. nov. Caule subtereti procumbente ramulos florigeros parvifoliatos sæpe emittente, foliis lineari-oblanceolatis mucronatis margine denticulatis uninerviis ramulorum florigerorum parvis ovatis summis integris et spinuloso-acuminatis foliis omnibus sessilibus puberulis, capitulis solitariis vel paucis juxta apicem ramulorum oriundis, involucro 3-seriali hujus phyllis lanceolatis spinuloso-acuminatis albo-marginatis ciliolatis.

Hab. Damaraland, 1879; *T. G. Fen* (Herb. Mus. Brit.).

Folia majora 2·0–5·0 cm. long. (modica circa 3·0 cm.) et 0·4–0·55 cm. lat.; folia minora usque ad 0·3 × 0·15 cm. imminuta, alia vero 0·5–0·8 cm. long. exstant. Pedunculi circa 0·2 cm. long. Capitula 0·6 cm. diam. Involucri phylla extima 0·2 cm. long., et

0·04 cm. lat., interiora 0·3 cm. long., 0·08 cm. lat. Flosculorum fœm. corolla 0·2 cm. long., ima basi parum dilatata; flosculorum hermaph. corolla a basi sensim amplificata, vix 0·3 cm. long. Antheræ subinclusæ. Flosculorum hermaph. styli pars exserta 0·2 cm. long. Achænia oblonga, 0·06 cm. long.; pappi setæ circa 0·22 cm. long.

Nicolasia pedunculata, sp. nov. Caule gracili subtereti deinde glabrato, foliis sessilibus albo-pubescentibus senioribus oblanceolatis obtusis margine denticulatis uninerviis junioribus oblongis, mucronulatis, capitulis pedunculis folia juvenilia subæquantibus fultis solitariis, involucro circa 4-seriali hujus phyllis linearibus vel anguste lineari-lanceolatis obtusiusculis puberulis.

Hab. Damaraland, 1879; *T. G. Fen* (Herb. Mus. Brit.).

Folia majora 2·5–3·0 cm. long., et 0·5–0·7 cm. lat., demum puberula; minora 0·8–1·0 cm. long., 0·3–0·4 cm. lat. Pedunculi 0·6–1·0 cm. long., puberuli. Capitula 0·7 cm. diam. Involucri phylla extima 0·2 cm. long.; interiora circa 0·3 cm. long., et 0·05 cm. lat. Flosculorum fœm. corolla 0·22 cm. long., ima basi dilatata; flosculorum hermaph. 0·32 cm. long., a basi gradatim dilatata. Antheræ omnino inclusæ. Flosculorum hermaph. styli sat validi pars exserta 0·2 cm. long. Achænia immatura oblonga; pappi setæ vix 0·3 cm. long.

It gives me much pleasure to associate with this genus the name of my friend Mr. Nicholas Brown, A.L.S., who for nearly thirty years has been a member of the scientific staff at the Royal Gardens, Kew, in which capacity he has rendered most valuable services to our science.

Aspilia chrysops, sp. nov. Caule simplici erecto folioso appresse hispidulo, foliis subsessilibus lanceolatis acutiusculis integris triplinerviis utrinque (præsertim vero pag. superiore) scabridis firme membranaceis, capitulis parvis campanulatis laxe cymosis sat longe pedunculatis, involucri phyllis triseriatis abbreviatis subæquilongis scabridis extimis late oblongis reliquis oblongo-obovatis omnibus obtusissimis herbaceis, ligulis obovatis bilobis, achæniis oblongo-turbinatis albo-villosulis minutissime maculatis pappo brevi cupulari inæqualiter biaristato onustis.

Hab. Laskarato, Somaliland, 1899; *Dr. Donaldson Smith* (Herb. Mus. Brit.).

Folia 4·0–6·0 cm. long., 1·0–1·8 cm. lat., in sicco viridia, petiolis hispidis 0·3 cm. long. fulta. Cymæ 5·0–10·0 cm. long. Pedunculi graciles. Capitula 1·5 cm. diam. Involucri phylla extima 0·3 cm. long., 0·13 cm. lat.; intima 0·4 cm. long. et 0·3 cm. lat. Paleæ obovato-oblongæ, apice tridentatæ ibidemque luteolæ, nigro-unilineatæ, 0·5 cm. long. Ligulæ modo 0·8 cm. long., 0·5 cm. lat. Achænia disci 0·4 cm. long., horum aristæ 0·15–0·25 cm. long.

An elegant species, readily distinguishable from its congeners by reason of its entire lanceolate leaves, small capitula, and short involucral leaves.

Euryops somalensis, sp. nov. Ascendens, humilis, sparsim ramulosus, ramulis dense foliosis subteretibus albo-araneoso-pubes-

centibus, foliis sessilibus oblanceolatis obtusis integris vel apice breviter trifidis carnosulis marginibus cartilagineis revolutis araneoso-pubescentibus vel puberulis, pedunculis folia multo excedentibus glabris, capitulis mediocribus terminalibus, involucri late campanulati phyllis 11–12 sæpe inæqualibus plerisque lanceolatis vel lineari-lanceolatis nonnullis oblongo-ovatis glabris, achæniis 5-angulari-cylindricis 10-costatis hispidulis.

Hab. Somaliland, near Lake Marsabit, 1898; *Lord Delamere* (Herb. Mus. Brit.).

Folia 2·0–3·0 cm. long., 0·2–0·6 cm. lat. Pedunculi 8·0–10·0 cm. long., in longitudinem striati. Capitula usque ad 1·5 cm. diam. Involucri phylla 0·65–0·8 cm. long., 0·13–0·2 cm. lat., raro usque ad 0·4 cm., margine scariosa, deorsum eminenter pluristriata. Receptaculum convexum, levissime alveolatum. Radii flosculi circa 14. Ligulæ oblongæ, tridentatæ, 0·2 cm. lat.; disci flosculorum interdum abortivorum corolla infundibularis. Achænia 0·2 cm. long. Pappi setæ caducissimæ, scabridæ, 0·4 cm. long.

A very distinct species, most like *E. Dregeana* Sch. Bip.; its leaves, ligules, &c., are, however, quite different from those of the Cape plant. From a geographical point of view, this is extremely interesting.

Tripteris angustissima, sp. nov. Suffrutex, caule ascendente robusto cortice spongioso circumdato foliorum evanidorum reliquiis crebro induto, ramulis foliosis hirtulis, foliis alternis lanceolatis oblanceolatisve obtusis plus minus amplexicaulibus sparsim denticulatis superioribus integerrimis hirto-puberulis, capitulis parvis longe pedunculatis, involucri late campanulati phyllis subuniseriatis inter se subæqualibus lineari-lanceolatis marginibus scariosis, receptaculo plano, ligulis oblongis breviter trifidis, antherarum auriculis acutis, flosculorum hermaph. stylo obscurissime bifido, radii achæniis lineari-clavatis angustissime 3-alatis.

Hab. Gan Liban, Somaliland, 1899; *Dr. Donaldson Smith* (Herb. Mus. Brit.).

Caulis circa 0·5 cm. diam., radicibus validis elongatis distanter fibrilliferis suffultis. Folia usque ad 7·0 cm. long. et 2·0 cm. lat. (modica vero 4·0 × 0·8–1·0 cm.). Pedunculi 5·0–10·0 cm. long., foliis parvulis 1–3, linearibus, circa 0·5 cm. long. onusti. Involucri phylla 0·5 cm. long. et circa 0·13 cm. lat. Ligulæ 1·0 cm. long., 0·25 cm. lat., 4-nervosa. Flosculorum hermaph. corolla vix 0·5 cm. long., juxta basin subito angustata. Radii achænia glabra, 0·6–0·7 cm. long., basi 0·06 cm. superne 0·14 cm. diam.; alæ 0·04 cm. lat.; achænia abortiva 0·4 cm. long., alba.

At first sight this might pass for an *Osteospermum;* indeed, it is not at all unlike *O. herbaceum* L. The fruit, however, is that of *Tripteris*, though the wings are almost invisible until the achenes have been moistened. The relatively long and slender achenes with their subobsolete wings, together with the hirtulous clothing, the membranous denticulate leaves, and the small heads on long peduncles, are the distinctive marks of the species.

Fagelia (§ Scaposæ) **falklandica**, sp. nov. Herbacea, pilis albidis pilulosa, foliis radicalibus ovatis vel ovato-oblongis obtusis

serrato-dentatis basi cuneatim in petiolum longum et latum laminam subæquantem desinentibus plurinerviis, pedunculis folia magnopere excedentibus scapiformibus apice 2–4-floris sursum arcte et minute glanduloso-pubescentibus, calycis lobis late ovatis obtusis, corollæ labio superiori calyce breviore inferiori obovato obtusissimo basi subito insigniter contracto ore ovato-rotundato.

Hab. Falkland Islands; *Mrs. E. Nichol* (Herb. Mus. Brit.).

Foliorum lamina 6·0–7·0 cm. long., 2·5–4·0 cm. lat., membranacea, margine præsertim necnon pagina superiore pilifera; petioli circa 0·5 cm. lat. Pedunculi fere 25·0 cm. attingentes, erecti, teretes, 0·25 cm. diam.; pedicelli patuli, 1·0–1·5 cm. long. Calyx 0·7 cm. long., glanduloso-pubescens; lobi 0·45 cm. long., 0·25–0·4 cm. lat. Corollæ labium superius 0·4 cm. long.; labium inferius 1·5 cm. long., medio vix totidem lat., ima basi usque ad 0·6 cm. angustatum, flavum maculis parvis purpureis conspersum. Ovarium ovoideum, glanduloso-pubescens, 0·6 cm. long. Capsulæ non suppetunt.

A well-marked species, apparently nearest *F. plantaginea* (*Calceolaria plantaginea* Sm.), with some forms of which it agrees almost exactly in the matter of foliage. The shape of the corolla, and especially of the lower lip, is, however, very different in the two cases, the lower lip in *F. falklandica* being longer in relation to its width, and suddenly and pronouncedly narrowed at the base. This character alone at once suffices to distinguish the two plants.

Craterostigma hirsutum, sp. nov. Humilis, acaulis, foliis parvis membranaceis rosulatis oblongo-spathulatis obtusiusculis integris utrinque albide piloso-hirsutis, scapo ascendente gracili folia longe excedente piloso-hirsutulo, bracteis ovatis vel ovato-lanceolatis acutis extus piloso-hirsutis, pedicellis calycibus subæquilongis, calycis turbinati piloso-hirsuti lobis lanceolatis acutis quam tubus duplo brevioribus, corollæ glabræ tubo infundibulari labio superiore oblongo emarginato margine leviter undulato labio inferiore late trilobo lobis crispe undulatis, antheris per paria approximatis, ovario ovoideo-oblongo acuto.

Hab. Kapte Plains, British East Africa, 1893; *Dr. J. W. Gregory* (Herb. Mus. Brit.).

Planta nequaquam ultra 6·0 cm. alt., basi fibras attenuatas copiose emittens. Folia 1·5 cm. long., circa 1·0 cm. lat., deorsum decoloria ibique parallele 5-nervia nervis diu persistentibus. Scapus 3·5–4·5 cm. alt., 0·05 cm. diam., secundum specc. meos ante oculos solitarius. Bracteæ 0·5–0·7 cm. long., intus glabræ. Pedicelli 0·45 cm. long., piloso-hirsuti. Calyx totus 0·6 cm. long.; tubus 0·4 cm. long., sursum 0·2 cm. diam.; lobi 0·2 cm. long. Corollæ tubus 0·7 cm. long., basi 0·1 cm. sub limbo 0·25 cm. diam.; labium superius 0·7 cm. long.; labii inferioris lobi subæquales, 0·25 cm. long. Capsula ?

A very distinct species, easily recognized by its habit, indumentum, small membranous leaves with persistent vascular bundles, &c.

Craterostigma Smithii, sp. nov. Planta acaulis radice e fibris tenacibus crebro fibrilliferis sistente, foliis diversiformibus nunc

late ovatis nunc oblanceolato-oblongis semper obtusissimis basi in petiolum latum satis elongatum desinentibus raro subsessilibus supra glabris subtus appresse hirsutulo-pubescentibus, scapo gracili simplici folia longe excedente 3–4-floro, floribus fere omnino sessilibus, calycis pilosiusculi subturbinati lobis deltoideis tubo duplo brevioribus, corollæ tubo infundibulari hujus labio superiore oblongo-ovato evanide emarginato, antheris per paria approximatis, ovario ovoideo compresso.

Hab. Jara, Somaliland, Oct. 1899 ; *Dr. Donaldson Smith* (Herb. Mus. Brit.).

Foliorum lamina usque 1·5 cm. long. et 1·3 cm. lat., plerumque vero minor, flabellatim 3–5-nervis, petiolo usque 1·0 cm. long. (sæpe vero breviori) fulta, læte virens, firme membranacea. Scapus 3·0–3·5 cm. long., albo-pilosus. Bracteæ modicæ 0·6 cm. long., vix totidem lat., margine ciliatæ, floribus arcte applicatæ. Calyx totus 0·45 cm. long. ; lobi 0·15 cm. long., basi 0·1 cm. lat., albociliati. Flores cyanei. Corollæ tubus 0·8 cm. long., juxta basin 0·2 cm. sub limbo 0·35 cm. diam. ; hujus labium superius 0·5 cm. long. et 0·4 cm. lat. ; labii inferioris lobi laterales ovati, obtusissimi, 0·35 cm. lat., lobus intermedius late obovatus, 0·4 cm. lat. Capsula ——.

A very distinct species, agreeing in many details of its inflorescence with the Angolan *C. crassifolium* Engl., but quite different from it in habit and foliage. In the latter character it is much like *C. plantagineum* Hochst.

Sopubia Eenii, sp. nov. Minute lepidoto-tomentella demum fere glabra, caule erecto crebro ramoso tetragono folioso, foliis oppositis lineari-lanceolatis obtusis vel obtuse acutis integris rarius breviter denticulatis, pedicellis oppositis raro ternatim verticillatis juxta medium bibracteatis, bracteis linearibus acutis, calycis lobis oblongis obtusissimis tubum excedentibus, corollæ limbi lobis obovatis calyce longioribus.

Hab. Damaraland ; *T. G. Fen*, 1879 (Herb. Mus. Brit.).

Caulis 0·15–0·3 cm. diam., tetragonus, internodia pleraque circa 1·0–1·5 cm. long. Folia 1·5–2·5 cm. long., 0·25–0·4 cm. lat., membranaceo-coriacea, sursum deinde fere glabra. Pedicelli 0·5–1·0 cm. long. Bracteæ 0·2 cm. long. Calycis tubus 0·15 cm. long. ; hujus lobi 0·2 cm. long., 0·12 cm. lat. Corollæ tubus 0·35 cm. long. ; limbus expansus circa 1·0 cm. diam., lobi 0·45 cm. long. et vix totidem lat. Capsula oblonga, emarginata, 0·4 cm. long. Semina ovoidea, vix 0·1 cm. diam.

Closely allied to *S. leprosa* S. Moore (*vide* p. 468), and differing from it in indumentum, shape of leaves, and larger flowers with somewhat diverse calyx and corolla.

Crossandra Smithii, sp. nov. Caule ascendente verisimiliter humili superne folioso pubescente, foliis parvis petiolatis ellipticis obtusis basi angustatis molliter pubescentibus, pedunculis abbreviatis pubescentibus, spicis brevibus paucifloris, bracteis lanceolato-oblongis acutis integris muticis piloso-pubescentibus, bracteolis linearibus acuminatis calycem excedentibus, calycis segmento

postico binervi bidentato lateralibus ovatis acuminatis, ovario glabro, stylo pilosiusculo, capsula anguste ellipsoidea acuta 4-sperma.

Hab. British East Africa, Msai, 1899; *Dr. Donaldson Smith* (Herb. Mus. Brit.).

Specc. nobis obviorum caulis 8·0 cm. alt., demum puberulus. Folia circa 1·5 cm. long. et 1·0 cm. lat., subtus pallidiora, petiolis circa 0·5 cm. long. fulta. Pedunculi circa 0·7 cm. long. Spicæ 1·5 cm. long., 0·8 cm. diam. Bracteæ 0·7–0·8 cm. long., 0·3–0·4 cm. lat., trinerves. Bracteolæ 0·7 cm. long. Calycis segmentum posticum 0·6 cm. long.; segmenta lateralia 0·4 cm. long. Corollæ tubus puberulus, 2·2 cm. long., ima basi 0·2 cm. medio 0·1 cm. sub limbo 0·15 cm. diam. Antheræ pilosæ. Ovarium 0·35 cm. et stylus 2·0 cm. long. Capsula 0·8 cm. long., 0·3 cm. diam. Semina lepidibus ciliatis onusta, 0·2 cm. diam.

Nearest *C. leikipiensis* Schweinf., but the obtuse petiolate leaves, the extremely short peduncles, the short and narrow spikes, and differently shaped bracts afford good distinctive characters.

Dr. Rand's Rhodesian Labiatæ.

Ocimum hians Benth. Salisbury, Sept. No. 621.

Ocimum americanum Mill. Buluwayo, early January and June. Nos. 164, 516.

Ocimum (§ Hierocimum) **Randii**, sp. nov. Caule erecto puberulo basi lignoso superne sparsim ramoso ramulis ascendentibus tenuibus, foliis sessilibus linearibus vel anguste lineari-oblanceolatis obtusis margine revolutis glabris congestim subverticillatis internodiis subæquilongis vel duplo brevioribus, spicis elongatis, verticillastris distantibus plerumque 4–7-floris, bracteis sæpe coloratis lanceolatis sursum longe attenuatis acutis pedicellos brevissimos dense albo-tomentosos multo excedentibus, floribus parvis, calycis campanulati lobo postico orbiculato brevissime cuspidulato-acuminato lobis lateralibus quam posticus brevioribus truncatis lobis anticis setaceo-acuminatis, corollæ tubo calyci æquilongo limbi lobo antico leviter concavo, staminibus longe exsertis.

Hab. Salisbury; Sept. 1898. No. 618.

Planta sat gracilis, circa 30·0 cm. alt. Folia 1·5–2·0 cm. long., 0·1–0·15 cm. (raro 0·25–0·35 cm. attingentia) lat. Spicæ usque 13·0 cm. long., puberulæ. Bracteæ 0·4–0·5 cm. long., nunc virescentes nunc purpurascentes. Pedicelli circa 0·1 cm. long. Calyx 0·3 cm. long., pæne totidem lat., breviter necnon appresse albo-puberulus; lobus posticus decurrens, in sicco atripurpureus, 0·2 cm. lat., dense albo-ciliatus; loborum anticorum appendices 0·12 cm. long. Corollæ tubus 0·3 cm. long.; limbi lobus anticus 0·2 cm. long.; lobi reliqui oblongo-obovati, 0·15 cm. long. Filamenta circa 0·8 cm. long., staminum posticorum ad 0·1 cm. supra insertionem dense pilifera. Nuculæ ——.

O. verticillifolium Baker, a Somaliland plant, has much the appearance of this, but, irrespective of certain differences in leaf and flower, it is a member of another section. The chief distinguishing points of *O. Randii* among its congeners of § *Hierocimum*

are the narrow pseudo-verticillate leaves, the relatively elongated bracts and the densely woolly pedicels.

Acrocephalus sericeus Briq. Buluwayo, early January. No. 146.
Basilicum myriostachyum O. Kze. Salisbury, July. No. 526.
Orthosiphon linearis Benth. Buluwayo, May. No. 386.
Orthosiphon Kirkii Baker. Buluwayo, May. No. 384.
Orthosiphon Elliottii Baker. Buluwayo, Dec. No. 167.
Orthosiphon bracteosum Benth, Salisbury, late Dec. No. 166.
Orthosiphon shirensis Baker. Buluwayo, early January. No. 143.
Hoslundia verticillata Vahl. Buluwayo, Dec. No. 163.
Plectranthus floribundus N. E. Br. Salisbury, Aug. No. 524.

Coleus (§ Calceolus) **palliolatus,** sp. nov. Caule deorsum procumbente sursum sparsim ramoso, ramis ascendentibus pilosis, foliis late obovatis obtusissimis basi in petiolum brevem sensim angustatis dimidio superiore crenatis inferiore integris puberulis una cum caule calycibusque glandulis minutis rubescentibus copiose obsitis, spicis simplicibus elongatis densifloris, verticillastris circa 6-floris approximatis ætate paullulum disjunctis, bracteis maximis alabastra laxe circumdantibus latissime rotundatis breviter cuspidatis minute pubescentibus margine piloso-ciliatis deciduis, calyce fructifero deflexo puberulo intus annulatim villoso lobo postico late rotundato breviter cuspidato leviter decurrente lobis reliquis postico longioribus lanceolatis acutis, corollæ tubo defracto calycem bene excedente gracili labio inferiore stipitato cymbiformi.

Hab. Buluwayo; early January, 1898. No. 144.

Caulis sat robustus, eleganter striatus, 0·3 cm. diam. Folia circa 3·0 cm. long., usque ad 2·0 cm. lat. (ramulorum 2·0 × 1·3 cm.), petiolis 0·3 cm. long. fulta. Spicæ usque 12·0 cm. long., pilosæ. Bracteæ tenuiter membranaceæ, expansæ, fere 1·0 cm. long. et lat. Calycis fructiferi lobus posticus 0·6 cm. lat., 0·25 cm. long.; lobi reliqui 0·3 cm. long., ciliati. Corollæ tubus 0·5 cm, long., 0·2 cm. lat.; labii inferioris stipes vix 0·3 cm. long., pars cymbiformis 1·0 cm. long., acutus. Filamentorum vagina 0·5 cm. long. Nuculæ ovoideæ, 0·15 cm. diam.

Allied to *C. barbatus* Benth., but its indumentum, extremely broad bracts, different upper calyx-lobe, narrow corolla-tube, and smaller cymbiform part of lower lip of corolla are well-marked distinctive characters.

Pycnostachys urticifolia Hook. Salisbury, July. No. 525.
Mentha sylvestris L. Salisbury, late Dec. No. 145.
Salvia runcinata L. fil. Buluwayo, early January. No. 134.
Scutellaria Livingstonei Baker. Salisbury, Sept. No. 520.
Leucas martinicensis R. Br. Buluwayo, May. No. 385.

Leucas (§ Hemistoma) **Randii,** sp. nov. Caule procumbente sparsim ramoso villoso-tomentoso, foliis brevipetiolatis oblongo-ovatis obtusis basi cuneatim angustatis margine deorsum integris sursum crenato-serratis utrinque adpresse villosulo-pubescentibus, verticillastris globosis multifloris, bracteis elongatis lineari-lanceolatis calyci subæquilongis hispidis, calycis villosuli 10-dentati in fructu recurvi tubo a basi sensim amplificato ore obliquo labii

superioris dentibus elongatis linearibus labii inferioris dentibus abbreviatis deltoideis obtusis erectis, corollæ tubo glabro labio inferiore puberulo galea villoso.

Hab. Salisbury; July, 1898. No. 522.

Caulis 0·2 cm. diam. intervallis 2·0–4·0 cm. long. sparsim foliosus. Folia 3·0–4·0 cm. long., 1·5–2·2 cm. lat., firma, in sicco pallide viridia; petioli 0·4 cm. long. Verticillastri 3·0–4·0 cm. diam. Bracteæ vix 1·5 cm. long. Calyx totus 1·5 cm. long., basi 0·25 cm. medio 0·5 cm. diam.; dentes superiores 3, 0·4 cm. long.; dentes inferiores vix 0·1 cm. long. Corollæ tubus vix 1·0 cm. long., 0·2 cm. diam.; galea tubo æquilonga; labii inferioris lobus intermedius bifidus, 0·5 cm. long.; lobi laterales vix 0·3 cm. long. Nuculæ leviter triquetræ, politæ, 0·2 cm. long.

L. Randii should be placed near *L. densiflora* Vatke and *L. Holstii* Gürke, from both of which it differs in several important points. In external appearance it is much like *L. nyassæ* Gürke, but the dissimilar leaves, calyces, &c., of the two render further comparison unnecessary. The relatively broad leaves entire at the margin in their lower half, the hispid bracts, and the long teeth of the upper and short teeth of the lower lip of the ultimately reflexed calyx are the chief characteristics of the species.

Dr. Rand notes of this plant:—"The verticillasters are bell-shaped and I fancy the seeds are dispersed by the rolling about of these when detached, as the stems are procumbent."

Lasiocorys capensis Benth. Buluwayo, Dec. No. 162.

Leonotis Randii, sp. nov. Caule sparsim ramoso arcte et breviter pubescente, foliis parvis subsessilibus oblanceolatis obtusis deorsum longe sensim angustatis margine grosse serratis basin versus integris utrinque (præsertim subtus) appresse pubescentibus, verticillastris circa 15-floris, bracteis lineari-subulatis breviter spinoso-acuminatis, floribus breviter pedunculatis, calycis 8-dentati minute puberuli dentibus spinoso-acuminatis dente postico reliquis majori.

Hab. Buluwayo; Dec. 1897. No. 165.

Caulis circa 0·3 cm. diam., aliquantulo tetraqueter. Folia 3·0–5·0 cm. long., 0·5–0·8 cm. lat., summa nonnunquam integerrima vel margine serraturis utrinque 1 vel 2 interrupta, subtus eminenter nervosa. Bracteæ paullo ultra 1·0 cm. long., circa 0·1 cm. lat., versimiliter demum reflexa. Pedunculi 0·2 cm. long., pubescentes. Calycis tubus 1·5 cm. long., basi circa 0·2 cm. diam., juxta medium usque 0·5 cm. gradatim dilatatus, ore paullo coartato; dentes laterales subæquales, lanceolati, circa 0·3 cm. long., dens posticus late ovatus, 0·7 cm. long. Corollæ tubus 1·5 cm. long.; galea 1·7 cm. fere attingens.

The verticillasters look much like those of *L. dubia* E. Mey., but the calyx of the latter is different in some points, and its leaves are altogether dissimilar. *L. malacophylla* Gürke, a Natal plant, is somewhat like *L. Randii* in general appearance, but it has much larger and broader long-petioled leaves and calyces different in several respects.

The following was omitted from the list of Dr. Rand's Acanthaceæ (Journ. Bot. xxxviii. 201) :—

Blepharis innocua C. B. Clarke. Buluwayo, early January. No. 281.

Monothecium abbreviatum, sp. nov. Caule verisimiliter elato tereti geniculato pubescente, foliis graciliter petiolatis anguste ellipticis obtusiusculis basi cuneatis fere glabris, spicis pedunculatis abbreviatis densifloris, foliis floralibus ovato-lanceolatis acuminatis bracteas bracteolasque lanceolatas subæquantibus una cum his et calycis segmentis minute pubescentibus, calycis segmentis linearibus nec setaceis, corollæ labio postico integro, staminibus breviter exsertis, capsula claviformi puberula.

Hab. Kavirondo, British East Africa; *G. F. Scott Elliot*, No. 7016 (Herb. Mus. Brit.).

Foliorum lamina 3·0–5·0 cm. long., tenuiter membranacea; petioli 0·4–1·0 cm. long. Spica modo 1·5 cm. long., 1·0 cm. diam. Folia floralia circa 0·5 cm. long. Calycis segmenta paullo inæqualia, 0·4–0·5 cm. long. Corollæ tubus 0·8 cm. long., 0·12 cm. lat., basi parum amplificatus; limbi labium posticum lanceolatum, anticum trifidum, late oblongum, ambo 0·4 cm. long. Capsula 0·6 cm. long., 4-sperma. Semina normalia, 0·13 cm. diam.

An interesting addition to a very small genus. The extremely short and broad spikes and the linear, not setaceous, bracts and bracteoles are its chief peculiarities.

Justicia (§ Calophanoides) **Elliotii**, sp. nov. Suffrutex ramosus, rigidus, ramis sat raro foliatis crebro ramulosis minute pubescentibus, foliis parvis sessilibus oblongis vel lineari-oblongis obtusis primo arcte albo-tomentellis mox pubescentibus vetustis puberulis, foliis floralibus reliquis similibus, bracteolis oblongis acutiusculis calycem semiæquantibus, calycis 5-partiti tomentelli corollæ tubum subæquantis lobis inter se æqualibus oblongis obtusis, corollæ extus minute pubescentis tubo infundibulari, limbi labio postico bilobo, antherarum loculis inæqualibus vel subæqualibus loc. inferiore nonnunquam ecalcarato vel etiam obsolete, capsula minute pubescente.

Hab. British East Africa, Masailand, at 6000 ft.; *G. F. Scott Elliot* (Nos. 6593, 6637 in Herb. Mus. Brit.).

Folia modica 0·6–1·0 cm. long., ramulorum vero sæpe usque ad 0·2–0·3 cm. imminuta. Bracteolæ 0·2 cm. long. Calyx 0·4 cm. long.; lobi parum carinati. Corolla purpurea, in toto vix 1·0 cm. long.; hujus tubus 0·45 cm. long.; labium posticum ovato-oblongum, circa 0·32 cm. lat., ejus lobi rotundati, undulati, 0·12 cm. long.; labii antici lobi late rotundati, lobus intermedius 0·3 cm. lat., quam laterales paullo latior. Ovarium oblongum, 0·14 cm. long. Stylus pilosus. Capsula 0·7 cm. long., obtusiuscula. Semina triangulari-oblonga, tuberculata, pallide brunnea, 0·22 cm. long.

Apparently nearest *J. Urbaniana* Lindau, which has strigose or hispid branches, sparsely hairy leaves, a different calyx, normal anthers, &c.

The occasional absence of a spur from the lower cell of the anthers, and the possible reduction of these organs to the unilocular condition are matters worthy of mention.

Dr. Rand's Rhodesian Scrophulariaceæ.

Aptosimum elongatum Engl. Bechuanaland, Oct. No. 641.
Aptosimum Randii S. Moore. Buluwayo, Oct. No. 180.
Diclis petiolaris Benth. Buluwayo, May. No. 372.

Sutera fissifolia, sp. nov. Minute glanduloso-puberula, ramulis ascendentibus sparsim ramosa, foliis superioribus alternis omnibus brevipetiolatis ambitu ovatis vel ovato-oblongis obtusis pinnatifido-lobatis lobis crenato-serratis integrisve nervis lateralibus utrinque 2–4 subtus eminentibus, floribus aliis axillaribus aliis in racemum terminalem satis elongatum dispositis, bracteis inferioribus foliis consimilibus nisi minoribus superioribus trilobis summis revera linearibus infimis exemptis quam pedicelli insigniter brevioribus, calycis alte partiti lobis oblongo-spathulatis obtusis vel obtuse acutis a corollæ tubo fere duplo superatis, corollæ tubo deorsum sat angusto cylindrico sub limbo subito amplificato lobis ovatis obtusissimis, staminibus inclusis.

Hab. Buluwayo, early Jan. 1898. No. 155.

Planta ascendens 30·0 cm. alt. attingens. Caulis gracilis, paullo ultra 0·1 cm. diam., subteres. Foliorum maximorum lamina 2·5 cm. long. vix usque 1·0 cm. lat., modice vero circa 1·5 cm. long. et 0·7 cm. lat. Petioli modici circa 0·5 cm. long., anguste alati. Racemi usque 15·0 cm. long. Pedicelli 0·6–1·0 cm. long. Calycis lobi 0·3 cm. long., 0·1 cm. lat. Corollæ flavæ tubus vix curvatus, 0·5 cm. long., deorsum 0·2 cm. faucibus vix 0·4 cm. diam.; limbi 0·6 cm. diam. lobis 0·2 cm. long. et lat. Staminum superiorum antheræ fere exsertæ, inferiorum manifeste inclusæ. Capsulam non vidi.

The affinity of this seems to be with *Sutera montana* (*Chænostoma montanum* Diels), a Transvaal plant, from which its larger leaves, narrower calyx-lobes, and the relatively longer and narrower tube and different limb of its yellow corollas serve as admirable points of distinction.

Lyperia Burkeana Benth., var. Buluwayo, May. No. 371.
Lyperia atropurpurea Benth. Buluwayo, May. No. 370.
Mimulus gracilis R. Br. Buluwayo, Dec. and May. Nos. 156, 368, 506.
Limnophila gratioloides R. Br. Salisbury, July. No. 518.
Craterostigma plantagineum Hochst. Buluwayo, Dec. No. 157.

Buchnera (§ Imbricatæ) **Randii.** sp. nov. Erecta, **elata,** caule attenuato parce folioso piloso-hispidulo, foliis radicalibus ovatis vel ovato-oblongis obtusis caulinis hæc excedentibus anguste linearibus obtusis quam internodia brevioribus, spicis abbreviatis densifloris, bracteis calyci subæquilongis ovato-lanceolatis acutis hispidulis, calycis hispidi tubulosi obscure nervosi lobis triangulari-setaceis quam tubus 3-plo brevioribus, corollæ tubo attenuato recto calycem vix duplo superante pilosulo limbi lobis obovato-oblongis obtusissimis fere omnino inter se æqualibus.

Hab. Salisbury; July, 1898. No. 573.

Planta 16–35 cm. alt. Caulis vix 0·1 cm. diam. Folia radicalia 1·0–2·0 cm. long., 0·5–0·6 cm. lat.; caulina 2·0–3·0 cm. long., 0·15 cm. lat. (internodia 4·0–7·0 cm. long.), sursum vero minora. Spicæ paullo ultra 1·0 cm. long. Bracteæ modicæ 0·5 cm. long. Bracteolæ setaceæ, vix 0·3 cm. long. Calyx 0·5 cm. long., hujus tubus vix 0·4 cm. et lobi 0·13 cm. long. Corollæ 0·9 cm. long. tubus 0·075 cm. lat., limbus nec ultra 0·3 cm. diam. et revera in sicco modo 0·15 cm. Capsula ——.

Apparently nearest *B. Welwitschii* Engl., its distinguishing features being the somewhat different indumentum, the larger bracts, and, above all, the greatly reduced flowers.

Buchnera (§ Vagifloræ) **rhodesiana**, sp. nov. Tota planta hispidulo-pubescens, caule sparsim ramoso ramis patulo-ascendentibus, foliis linearibus obtusis maxima pro parte ramulos abbreviatos ornantibus, floribus inferioribus distantibus superioribus approximatis, calyce elongato anguste tubuloso bracteas 2–3-plo excedente lobis lanceolatis acutis quam tubus 4-plo brevioribus, corollæ tubo attenuato extus pubescente calyce longiore limbi lobis obovatis saturate cyaneis.

Hab. Salisbury, Dec. 1897. No. 154.

Humilis et revera vix 16·0 cm. alt. attingens. Caulis teres, a basi ramosa vel deorsum simplex. Folia 0·7–1·5 cm. long., 0·1–0·15 cm. lat. Spicæ juveniles 1·5 cm. long., maturitate pluricentimetrales. Bracteæ abbreviatæ, ovatæ, acutæ, modicæ 0·2–0·3 cm. long. Calyx in toto 0·7 cm. long. et 0·15 cm. lat., hujus lobi vix 0·2 cm. long., post anthesin divergentes. Corollæ tubus usque 1·0 cm. long., plerumque vero paullo brevior; limbus circa 0·5 cm. diam. De fructu sileo.

At first sight this seems identical with a species native to Angola, *B. Henriquesii* Engl., both having the same general appearance, and calyx-lobes divaricate after flowering is over. But on placing side by side the moistened flowers of each, their calyces are seen to be quite different, those of *B. Henriquesii* being shorter and broader, with lobes not at all like those of the species here described.

Striga Thunbergii R. Br. Salisbury, July. No. 521.
Rhamphicarpa fistulosa Benth. Buluwayo, May. No. 387.
Cycnium adoense E. Mey. Buluwayo, Dec. No. 161.
Sopubia Dregeana Benth. Salisbury, Dec. No. 159.

Sopubia leprosa, sp. nov. Partibus juvenilibus (floribus exemptis) arcte ac minute leproso-tomentellis, caule stricto ramuloso sat valido maturitate glabro, ramulis ascendentibus crebro foliosis, foliis oppositis rarissime verticillatim approximatis anguste linearibus obtuse acutis integerrimis, pedicellis oppositis rarissime solitariis nunquam verticillatis folia floralia excedentibus vel ea subæquantibus, bracteolis filiformibus plerisque juxta medium pedicellum insertis, calycis lobis ovato-oblongis obtusissimis tubum excedentibus, corollæ parvæ limbi lobis obovato-rotundatis calyce longioribus.

Hab. Salisbury; Dec. 1897. No. 158.

Caulis 0·2–0·3 cm. diam., subteres; internodia pleraque 1·0–1·5 cm. long. Folia 1·5–2·5 cm. long., 0·1–0·2 cm. lat. Pedicelli 0·6–1·2 cm. et bracteæ 0·15–0·4 cm. long. Calycis tubus modo 0·1 cm. long; hujus lobi 0·13 cm. long. et vix totidem lat. Corollæ lobi 0·4 cm. long., 0·5 cm. lat. Capsula nondum matura oblonga, obscure emarginata.

This has somewhat the general appearance of *S. cana* Harv., but here the resemblance ceases; neither do I know of any species for which it is likely to be mistaken.

THE EUROPEAN SPHAGNACEÆ

(AFTER WARNSTORF)

By E. CHARLES HORRELL, F.L.S.

(Concluded from p. 426.)

47. S. CYMBIFOLIUM Warnst. in litt. (1895) apud Cardot Repert. Sphagnolog. 1897, 49.

Syn. *S. cymbifolium* Ehrh. Hannov. Mag. 1780, 235, ex parte.

Exsicc. Braithw. Sphagn. Brit. Exsicc. 1877, Nos. 7 (var. *glauco-pallens*), 8 (var. *fusco-flavescens*), 9 (var. *glaucescens* approaching forma *squarrosula*).

Tufts looser or denser, 7–20 cm. high, light green, grey or yellow-green to dark green or yellowish white to dirty greenish-yellow or brownish, rarely purplish or with any admixture of red.

Stem robust to delicate, yellow-brown, reddish, or rarely colourless.

Stem-cortex 2–4- (generally 3-) layered, the superficial layer smaller than the inner layers, with 1–9 (generally 3–6) pores, and rather delicate, not numerous fibrils, very rarely without fibrils.

Fascicles of 3–5 branches, of which 2–3 are spreading; leaves loosely or more densely arranged, generally spreading, more rarely imbricate, in the capitulum in hydrophilous forms frequently squarrose. Cortical cells of the branches always with numerous fibrils and pores. Generally mesocladous, rarely brachy- or macrocladous, sometimes eury-, more rarely dasy-cladous; homalodrepanocladous, rarely anocladous, and very rarely closely compressed, forming compact tufts.

Branch-leaves 1·7–3·5 (mean 2·3) mm. long, broadly ovate from a broad base, or from a narrower base much widened above; apex cucullate, with the more or less inrolled margin, in hydrophilous forms with squarrose recurved apex. Hyaline cells with rather numerous to numerous fibrils. Pores on the outer surface generally numerous in the angles and on the commissures, sometimes very numerous and in three rows on each cell, sometimes few; on the inner surface either numerous and in rows only near the lateral margins, and especially in the lower part, or in the upper part with 1–2 (rarely up to 5) round, large pores in the upper part of each cell.

Chlorophyllose cells in section narrowly isosceles-triangular to

narrow-trapezoid or almost spindle-shaped; distinctly excentric, with the wall usually of equal thickness all round, or rarely somewhat thickened on the inner surface of the leaf; enclosed on the outer surface by the strongly convex hyaline cells, or free as on the inner surface; hyaline cells never papillose.

Stem-leaves large, lingulate-spatulate, 1·5–3·1 (mean 2·1) mm. long, rarely twice as long as wide, generally the width about two-thirds the length. Rarely non-fibrillose or with a few delicate fibrils, generally with numerous strong fibrils throughout the entire leaf, and with a few to very numerous pores. Hyaline cells generally non-septate, but not rarely, and especially in the lower half, here and there divided. Border widest at the rounded apex, vanishing more or less towards the base.

Dioicous; the male plant less robust, the antheridium-bearing branches short and thick, olive-green. Inner perichætial leaves very large, formed of the two kinds of cells throughout, or more rarely formed of chlorophyllose cells only in the lower half, in the upper half resembling in structure the stem-leaves. Spores yellowish-brown, 28–33 μ in diameter.

Distrib. Throughout Europe and N. America; Siberia, Japan, &c.; Azores; S. America; Oceania (?).

This exceedingly common species can scarcely be mistaken for any other species but one of its own section; some of these, however, are very closely related to it, and are frequently distinguished with difficulty. The character to be chiefly relied upon for distinguishing the species in the *Cymbifolium* section is the position and form of the chlorophyllose cells as seen in a section from the middle part of the branch-leaves. Purple or brown forms of *S. cymbifolium* would appear to be rare in this country.

The varieties are based upon the colour of the tufts:—

(1) Var. *carneum* Warnst. in Verh. Bot. Ver. d. Prov. Brandenb. xli. 28. Flesh-coloured, especially in the capitulum, and with usually more or less green or yellow intermixed.

Dallington Forest, Sussex (*Nicholson*).

(2) Var. *flavo-glaucescens* Russ. apud Warnst. in Schrift. d. Naturf. Ges. in Danzig. N. F. Bd. 9, Heft 2 (1897). More or less yellowish in the capitulum, at times mixed with some blue-green, whitish below.

Moidart, Inverness (*Macvicar*); Cardiganshire (*Fleure*); Tilgate Forest, Sussex (*Horrell*); Theydon Bois, Epping Forest, Essex (*Horrell*); Oakmere, Cheshire (*Wilson*).

(3) Var. *fuscescens* Warnst. Die Europ. Torfm. 1881, 135. Tufts, especially in the upper part, a deep brown.

(4) Var. *fusco-flavescens* Russ. apud Warnst. Eur. Torfm. No. 322, 1894. Capitula yellowish to pale reddish, below pale greenish, passing over towards the base into a yellowish-brown colour.

Newchurch Bog (*Wilson*); Barmby Moor, Yorks (*Wilson*); Renfrewshire (*Ewing*); Cantyre (*Ewing*); between Talsarnau and Maentwrog, Merionethshire (*Jones & Horrell*); Aber Waterfall, Carnarvonshire (*Ley*); Harlech, Merionethshire (*Horrell*); Braemar

(*Miss Barton*); Widdy Bank Fell, Teesdale, Durham (*Horrell*); Budleigh Salterton, Devon (*Ley*); Ulpha Moss, Westmoreland (*Ley*); Darnholme, Goathland, Yorkshire (*Anderson*); Tremethick Moor, Penzance, Cornwall (*Curnow*); Oxfordshire (*Bagster*); Saltersgate Beck, Yorkshire (*Braithwaite*); Heathfield Park, Sussex (*Miss Barton*).

(5) Var. *fusco-glaucescens* Warnst. in Schrift. d. Naturf. Ges. in Danzig. N. F. Bd. 9, Heft 2 (1897). The capitulum a dirty brown, at times mixed with a little green, whitish below.

Chartley Moss, Stafford (*Bagnall*); Allt Dhubh Ghalair, Glen Lochay (*Cocks*); Cwm Bychan, Merionethshire (*Jones*).

(6) Var. *fusco-pallens* Warnst. *l. c.* The capitulum pale yellowish, below brownish.

Corriegill, Arran (*Ley*); Ardbeg, Islay (*Gilmour*); Hole Common, near Lyme Regis, Dorset (*Miss Lister*).

(7) Var. *fusco-rubescens* Warnst. Eur. Torfm. No. 323, 1894. Tufts reddish-brown with when dry a violet tinge.

Cwm Bychan, Merionethshire (*Jones*).

(8) Var. *glaucescens* Warnst. in Bot. Gaz. xv. 1890, 251. Generally bluish-green throughout.

Cannock Chase, Stafford (*Bagnall*); Wardstone, W. Lancs. (*Wheldon & Wilson*); Bont Newydd, Merionethshire (*Bagnall*); between Talsarnau and Maentwrog, Merionethshire (*Jones & Horrell*); Rhaiddr Ddu, Merionethshire (*Jones & Horrell*); Artro Valley, Merionethshire (*Jones & Horrell*); Ceunant Llenyrch, Merionethshire (*Jones & Horrell*); Cwm Bychan, Merionethshire (*Jones & Horrell*); Haverah Park, Harrogate, W. Yorks. (*Cocks*); Islay (*Gilmour*); Trelleck, Monmouth (*Ley*); Widdy Bank Fell, Teesdale, Durham (*Horrell*); Tilgate Forest, Sussex (*Horrell*); Roseberry Topping, N.E. Yorks. (*Horrell*); Brookwood, Surrey (*Monington & Horrell*); Theydon Bois, Epping Forest, Essex (*Horrell*); Newby Bridge, N. Lancs. (*Paul*); Hampstead Heath, Middlesex (*Horrell*); Llyffnant Valley, Cardigan (*Ellis*).

Forma *squarrosula* (Bry. Germ.).

Aran Mawddwy, Bont Newydd, Merionethshire (*Bagnall*); Wilderley Green, Salop (*Benson*); Artro Valley, Merionethshire (*Jones & Horrell*); Auchmore, Killin (*Cocks*); Sutton Park, Warwick (*Bagnall*); Little Brickhill, Bucks (*Saunders*); Bingley, Yorks. (*West*).

(9) Var. *glauco-flavescens* Russ. apud Warnst. Eur. Torfm. No. 318, 1894. Colour a mixture of pale yellow and bluish-green.

(10) Var. *glauco-pallens* Warnst. in Schrift. d. Naturf. Ges. in Danzig. N.F. Bd. 9, Heft 2 (1897). The capitulum white to pale yellowish, at times blue-green, whitish below.

Cornet's End, near Berkswell, Warwick (*Bagnall*); Blaze Moss, Wyresdale, W. Lancs. (*Wilson*); Ceunant Llenyrch, Merionethshire (*Jones*); Harlech, Merionethshire (*Jones*); Saltersgate Beck, Yorks. (*Anderson*); Tilgate Forest, Sussex (*Horrell*).

(11) Var. *pallescens* Warnst. Eur. Torfm. No. 9, 1888. Entire plant pale or almost white, without a trace of green.

Pendle Hill, W. Lancs. (*Wheldon*); Upper Grizedale, W. Lancs.

(*Wilson*); Calder Valley, W. Lancs. (*Wilson*); Artro Valley, Merionethshire (*Jones & Horrell*); Islay (*Ley*); Keston Common, Kent (*Horrell*); Burnham Common, Bucks (*Sherrin*); Owston Ferry, N. Lincolnshire (*Smith*); Tilgate Forest, Sussex (*Horrell*); Goathland, N.E. Yorks. (*Horrell*).

(12) Var. *purpurascens* Warnst. in Hedwigia, 1884, No. 7–8. In the upper part, and especially in the capitulum, a beautiful purple-red, paler below.

(13) Var. *versicolor* Warnst. Eur. Torfm. No. 7, 1888. Colour in the upper part pale reddish-violet, in the middle whitish, towards the base brownish.

Rhinog Fawr, Merionethshire (*Jones & Horrell*); Tilgate Forest, Sussex (*Horrell*); Sea Scales, Cumberland (*Ley*); Holt, E. Norfolk (*Burrell*).

48. S. CENTRALE Jensen, Bihang Till K. Svenska Akad. Handl. Bd. xxi. Afd. iii. No. 10, 1896.

Syn. *S. palustre* L. subsp. *intermedium* Russ. Zur Anat. der Torfm. 1887, 28. *S. papillosum* Warnst. var. *intermedium* (Russ.) Warnst. in Hedwigia, 1891, 159. *S. intermedium* Russ. in Archiv Naturk. Liv-, Est-, & Kurlands, ser. ii. Bd. x. Lief 4, 468, 1894.

Plants generally robust to very robust, 7–20 and also 30–40 cm. high, forming looser or denser tufts; light green, grey, grey-green, greenish-yellow, pale yellow, yellow to brown, brownish-green or dark brown; rarely submerged.

Stems generally rigid and erect, dark red-brown, rarely pale.

Stem-cortex in 3–5, generally in 4 layers, the superficial cells smaller than the inner, with numerous fibrils and 1–2 or at times 3–7 large round pores, sometimes almost without fibrils, and with only a single pore.

Fascicles of 3–5 branches, of which 2–3 are spreading; leaves loosely or closely arranged; branches meso- and macro-cladous, rarely brachycladous; eurycladous or more frequently dasycladous or very dense and compact; homalo-, drepano-, or ano-cladous, rarely katacladous. Cortical cells of branches strongly fibrillose and porose.

Branch-leaves large to very large, very concave, resembling those of *S. cymbifolium*. On the inner surface with numerous pores near the margins only, or not rarely in the middle and especially in the upper part of the leaf with 1–6, generally 1–2 large round pores on each cell; on the outer surface generally with numerous pores along the commissures.

Chlorophyllose cells in section triangular-oval, rectangular-trapezoid, barrel-shaped, elliptical to narrow-elliptical or spindle-shaped; outer wall always more or less strongly thickened; lumen always rounded, triangular-elliptical, elliptical, or oval, hypocentric or almost centric, sometimes also excentric.

Stem-leaves lingulate-spatulate, generally almost as large as the branch-leaves, but not rarely much smaller; two-thirds as wide as long or as wide as long; generally non-fibrillose or with a few delicate fibrils, sometimes with numerous fibrils; pores sometimes numerous; hyaline cells only very rarely here and there septate.

Distrib. Russia, Scandinavia, Switzerland, England; Asia; Africa; N. America. Foot of Ben More, Perthshire (*Dixon*); Strensall Common, N. Yorks. (*Wheldon*).

This fine species closely resembles *S. cymbifolium* in general habit, but is distinguished from that essentially by the form of the chlorophyllose cells as seen in section. They resemble those of *S. papillosum* in form and position, but the lumen is generally narrower, and the wall is quite without papillæ. It is probably widely distributed, but has not been distinguished.

The varieties are based upon the colour of the tufts:—

(1) Var. *flavescens* Russ. apud Warnst. Europ. Torfm. No. 307, 1894. Pale yellowish, with scarcely any admixture of blue-green.

(2) Var. *flavo-fuscescens* Russ. apud Warnst. in Schrift. d. Naturf. Ges. in Danzig, N. F. Bd. ix. Heft 2, 1896, 162. Yellow predominating, only a little brown.

(3) Var. *flavo-glaucescens* Russ. apud Warnst. Europ. Torfm. No. 308, 1894. Pale yellow, with some admixture of blue-green.

(4) Var. *fuscescens* Russ. apud Warnst. in Schrift. d. Naturf. Ges. in Danzig, N. F. Bd. ix. Heft 2, 1896, 162. Tufts almost entirely brown, yellow almost absent.

(5) Var. *fusco-flavescens* Russ. apud Warnst. Europ. Torfm. No. 313, 1894. Brown predominating, yellow only in the capitulum.

(6) Var. *glaucescens* Russ. apud Warnst. in Schrift. d. Naturf. Ges. in Danzig, N. F. Bd. ix. Heft 2, 1896, 162. Blue-green throughout the entire upper part.

Glen Lochay, Perthshire (*Cocks*).

(7) Var. *glauco-flavescens* Russ. apud Warnst. Europ. Torfm. No. 315, 1894. Blue-green predominating, mixed with pale yellow.

(8) Var. *pallescens* Warnst. in Schrift. d. Naturf. Ges. in Danzig, N. F. Bd. ix. Heft 2, 1896, 162. Tufts almost white throughout.

49. S. PAPILLOSUM Lindb. in Act. Soc. Sc. Fenn. x. p. 280 (1872).

Syn. *S. cymbifolium* var. *papillosum* Schimp. Syn. ed. 2, p. 848 (1876).

Exsicc. Braithw. Sphagn. Brit. Exsicc. 1877, Nos. 3 *a* (*S. papillosum* c. fr. = var. *normale*), 3 *b* (*S. papillosum*. "Addend. Exot." = var. *normale*), 4 *a* (*S. papillosum*, pl. masc. = var. *sublæve*), 4 *b* (*S. papillosum* = var. *normale*), 4 *c* (*S. papillosum* = var. *normale*), 5 *b* (forma *virens* = var. *normale*), 8 *b* (*S. cymbifolium* = *S. papillosum* var. *normale*), 10 *a* (*S. cymbifolium* var. *congestum* = *S. papillosum* var. *normale*).

In size and habit not distinguishable from *S. cymbifolium*; strongly papillose forms, generally deep brown and somewhat rigid.

Stem-cortex in 3–4 layers; cells very wide, thin-walled, and with delicate fibrils; outer wall of the superficial layer with generally 1–2, more rarely 3–4 large pores. Wood-cylinder brown to dark brown-red.

Stem-leaves sometimes smaller, sometimes larger, spatulate, on the wide rounded apex with a broad hyaline border; hyaline cells in the upper part rhombic, generally divided by a cross-wall, generally non-fibrillose and then with membrane-gaps only on the outer

surface towards the apex, or in the apical half and further down near the margins with fibrils and with pores on the outer surface.

Fascicles with in most cases four branches; the two stronger spreading, the others pendent; cortical cells of the branches fibrillose and porose. *Branch-leaves* large, wide-oval, with hyaline border on the cucullate apex; margin widely inrolled for some distance down the leaf; on the inner surface, only near the lateral margins, with large round pores; on the outer surface with membrane-gaps near the apex, and on the rest of the leaf with narrow semi-elliptical pores on the commissures, and where three cell-angles meet with large round pores, which near the lateral margin are frequently immediately opposite the pores on the inner surface. Fruiting branches with the cortex in 2–3 layers of thin-walled cells with strongly developed fibrils, and with 3–4 large pores on the outer wall of the superficial layer. Perichætial bracts very large, broadly ovate, in the lower half, except near the hyaline border, with elongated, rectangular, chlorophyllose cells only; in the apical half and near the lateral margins down to the base, of both kinds of cells; pores on the inner surface numerous near the margins; on the outer surface more numerous, in the upper cell-angles with large pores, and on the commissures with semi-elliptical pores, which are most numerous near the margins, and in part exactly cover the pores on the inner surface; hyaline cells on the inner surface, which is united to the chlorophyllose cells always more or less papillose.

Chlorophyllose cells in section narrow or wider, spindle-shaped to narrow barrel-shaped or almost rectangular, with the lumen almost or quite median, and with the outer wall much thickened and free on the inner surface of the leaf; on the outer surface either completely enclosed by the more strongly convex hyaline cells or free on both surfaces.

Dioicous; antheridium-bearing branches brown. Spores 28–32 μ in diameter, yellow-brown, papillose.

Hab. On moors both in the lowlands and the highlands. Very common.

Distrib. Throughout Europe, up to 6000 ft. in the Alps; N. America; Java.

This species is readily distinguished from all the others in the *Cymbifolium* section by the papillæ on the wall common to the chlorophyllose and the hyaline cells, which are not found in any other European species of the section. These papillæ, as in *S. squarrosum*, *S. teres*, and *S. Wulfianum*, in which they likewise occur, vary greatly in their degree of development, and this fact is taken advantage of to divide the forms into the two vars. *normale* and *sublæve*. The forms are based upon the colour and the compactness or otherwise of the tufts. Most British forms are readily distinguished from *S. cymbifolium* by their brown colour and their rigid habit.

(1) Var. *normale* Warnst. Europ. Torfm. No. 208, 1892. Walls having densely arranged, conspicuous papillæ.

Rhaiadr Ddu, Tyn-y-Groes, Merionethshire (*Jones & Horrell*); Cwm Idwal, Carnarvonshire (*Horrell*); near Llanbedr, Merioneth-

shire (*Mackie*); between Talsarnau and Maentwrog, Merionethshire (*Jones & Horrell*); Rhinog Fawr, Merionethshire (*Jones & Horrell*); Afon Prysor, Merionethshire (*Bagnall*); Whittington Moor, W. Lancs. (*Wilson*); Udale, W. Lancs. (*Wheldon & Wilson*); Clougha, W. Lancs. (*Wheldon*); Mallowdale Fell, W. Lancs. (*Wheldon & Wilson*); Harris End Fell, W. Lancs. (*Wheldon & Wilson*); Whitmoor, W. Lancs. (*Wilson*); Stansfield Moor, W. R. Yorks (*Nowell*); Champernhay Marsh, Wotton, W. Dorset (*Miss Lister*); Roseberry Topping, N.E. Yorkshire (*Horrell*); Trelleck Bog, Monmouth (*Ley*); Sutton Park, Warwick (*Bagnall*); Witherslack Moss, Westmoreland (*Ley*); Whixall Moss, Salop (*Ley*); Broadgate Bog, Staveley, Westmoreland (*Stabler*); Widdy Bank Fell, Teesdale, Durham (*Horrell*); Burnham Common, Bucks (*Sherrin*); Brookwood, Surrey (*Sherrin*); Baildon Moor, Yorkshire (*West*); Whitby, Yorks. (*Crotch*); Beamsley Beacon, Yorks. (*West*); Trengwainton Bog, Penzance, Cornwall (*Curnow*); New Forest, Hants (*Boswell*); Loch Achilty, Ross (*Braithwaite*); Aviemore, Easterness (*Macvicar*); Glen Rosa, Arran (*Ley*); Ben Lomond, Stirlingshire (*Ewing*); Meall Ghaordie, Perthshire (*Cocks*); Renfrewshire (*Ewing*); Cantyre (*Ewing*); Loch-na-Danm, Perthshire (*Cocks*); Ben Lawers, Perthshire (*Cocks*); Creag Mhor, Glen Lochay, Perthshire (*Cocks*).

Forma *conferta* (Lindb.) Warnst. Branches densely and closely arranged.

Afon Prysor, Merionethshire (*Bagnall*); Cwm Moch, Merionethshire (*Jones & Horrell*); Cader Idris, Merionethshire (*Jones & Horrell*); Rhinog Fawr, Merionethshire (*Jones & Horrell*); Artro Valley, Merionethshire (*Jones & Horrell*); Tyrau Mawr, Merionethshire (*Horrell*); Cwm Idwal, Carnarvonshire (*Horrell*); Upper Grizedale, W. Lancs. (*Wilson*); Widdy Bank Fell, Teesdale, Durham (*Horrell*); Hole Common, Lyme Regis, Dorset (*Miss Lister*); Baildon, Yorks. (*West*); Goathland, N.E. Yorks. (*Horrell*); Meathof Moss, Westmoreland (*West*); Tremethick Moor, Penzance, Cornwall (*Curnow*); Tarnbrook Fell, W. Lancs. (*Wheldon & Wilson*); Harris End Fell, W. Lancs. (*Wheldon & Wilson*); Sutton Park, Warwick (*Bagnall*); Arlary (*Herb. W. Wilson*); Meall-nan-Tarmichan, Perthshire (*Cocks*); Craig Chailleach, Perthshire (*Cocks*); Craig Mhor, Glen Lochay, Perthshire (*Cocks*); Wilsontown, Lanark (*Ewing*).

(2) Var. *sublæve* Limpr. apud Warnst. in Flora, 1884. Papillæ very minute, frequently very indistinct or altogether absent in some parts of the leaf, whilst distinct in other parts of the same leaf.

Llanwrtyd Wells, Brecon (*Painter*); Rhinog Fawr, Merionethshire (*Jones & Horrell*); between Talsarnau and Maentwrog, Merionethshire (*Jones & Horrell*); Artro Valley, Merionethshire (*Jones & Horrell*); Islay (*Gilmour*); Ben Lomond, Stirlingshire (*Ewing*); Udale, W. Lancs. (*Wheldon & Wilson*); Penmaenmawr, Carnarvonshire (*Mackie*); Arran (*Ley*); Trelleck Bog, Monmouth (*Ley*); Darnholme, N.E. Yorks. (*Boswell*); Witherslack Moss, Westmoreland (*Barnes*); Burnham Common, Bucks (*Sherrin*); Upper Roeburndale, W. Lancs. (*Wheldon & Wilson*); Brookwood, Surrey (*Sherrin*); Newby Bridge, N. Lancs. (*Paul*); Keston Common,

Kent (*Horrell*); Theydon Bois, Epping Forest, Essex (*Horrell*); Hebden Bridge, Yorks. (*Needham*); Widdy Bank Fell, Teesdale, Durham (*Horrell*); Whixall Moss, Salop (*Ley*); Haylot Greave, W. Lancs. (*Wheldon & Wilson*); Cockerham Moss, W. Lancs. (*Wheldon & Wilson*); Calder Valley, W. Lancs. (*Wilson*); Brindley Valley, Staffordshire (*Baynall*); Longridge Fell, W. Lancs. (*Wheldon*); Jeffrey Hill, W. Lancs. (*Wheldon*); Whitmoor, W. Lancs. (*Wheldon & Wilson*); above Oakenclough, W. Lancs. (*Wilson*); Fairsnape Clough, W. Lancs. (*Wilson*).

50. S. MEDIUM Limpr. Bot. Centralbl. 1881, 113.

Syn. *S. cymbifolium* varr. *purpurascens* et *compactum* p. p. Russ. Beitr. zur Kenntniss d. Torfm. 1865, 80.

Exsicc. Braithw. Sphagn. Brit. Exsicc. No. 10 b (*S. cymbifolium* var. *purpurascens* = *S. medium* var. *violascens* f. *dasyclada*).

Not differing in habit from *S. cymbifolium*; colour varying much, whitish, green, brownish, variegated with green and red, or purple.

Stem-cortex generally of four, more rarely of five layers of wide, thin-walled cells, which are non-fibrillose or with few delicate fibrils; outer wall of the superficial layer of cells with 1–2 large pores; wood-cylinder red.

Stem-leaves sometimes small, sometimes large, sometimes wider and shorter, sometimes narrower and longer, spatulate, frequently with the margin inrolled towards the apex, which has a hyaline border; hyaline cells in the upper part of the leaf rhomboid, rarely septate, non-fibrillose or with fibrils more or less developed; in the former case with membrane-gaps only on the outer surface in the apical half; in the latter case on the outer surface with pores in rows on the commissures and with membrane-gaps at the apex.

Fascicles of four branches, of which the two stronger are spreading, and the others are very thin and closely appressed to the stem; cortical cells of all the branches with fibrils and pores. Branch-leaves rather large, broadly ovate or oblong-ovate, with cucullate apex; margin with small teeth and inrolled for a considerable distance from the apex; on the inner surface with large round pores near the lateral margins, and with scattered pseudopores on the remainder of the leaf; on the outer surface with numerous semi-elliptical pores in rows on the commissures, which near the lateral margins of the leaf are to some extent immediately opposite the pores on the inner surface.

Upper perichætial bracts very large, broadly ovate, in the lower half with rectangular chlorophyllose cells only, above with both kinds of cells, the hyaline cells with or without fibrils; on the outer surface with numerous large membrane-gaps. Cortex of the fruiting branches generally in four layers of thin-walled cells of medium size, which are non-fibrillose or have a few delicate fibrils; outer wall of the superficial layer with 1–2 pores.

Chlorophyllose cells of the branch-leaves in section elliptical, centric, with oval lumen, completely enclosed on both sides by the biplanar hyaline cells, which are united together for some distance, but without having the wall thickened; hyaline cells on the inner surface, where united to the chlorophyllose cells, quite smooth.

Dioicous; male branches purple. Spores 24–28 μ in diameter, reddish, finely punctulate.

Hab. On moors, chiefly in the mountains, but not usually in very wet places.

Distrib. Throughout Europe, up to 4600 ft. in the Riesengebirge; Asia; N. America; S. America.

This species is very distinct in the position of the chlorophyllose cells, and may generally be at once recognized from the other species of the section by the colour, which is, in most cases, distinctly red or purple.

The varieties are based upon the colour:—

(1) Var. *albescens* Warnst. in Bot. Gaz. 1890, 254 (ut var. *læve* f. *albescens*). Plants completely bleached and white throughout.

(2) Var. *flavo-glaucescens* Russ. apud Warnst. in Schrift. d. Naturf. Ges. in Danzig, N.F. Bd. ix. Heft 2, 1896, 164. Capitulum yellowish, at times blue-green, pale below.

(3) Var. *fuscescens* Warnst. in Bot. Gaz. 1890, 254 (ut var. *læve* f. *fuscescens*). Plants more or less brown above, whitish or violet-brown below.

(4) Var. *glaucescens* Russ. apud Warnst. in Schrift. d. Naturf. Ges. in Danzig, N.F. Bd. ix. Heft 2, 1896, 164. Blue-green throughout the whole upper part, pale below or at times mixed with some brown; red quite absent.

(5) Var. *glauco-purpurascens* Russ. *l. c.* More or less red in the capitulum (at times passing over into a dirty brownish-red), sometimes green, whitish or more or less brown below.

(6) Var. *obscurum* Warnst. Europ. Torfm. No. 23, 1888. In the upper part a dark dirty brownish-green, in the middle pale reddish, paler below.

Brookwood, Surrey (*Sherrin*).

(7) Var. *purpurascens* Warnst. in Flora, 1884. Red predominating in the entire tuft, which in the capitulum and in the lower part frequently passes over into a brownish red; green and yellow almost entirely absent.

Jura (*Ewing*); Lochar Moss, Dumfries (*B. & H. Hamilton*); Creag Mhor, Glen Lochay, Perthshire (*Cocks*); near Coleman's Hatch, Ashdown Forest, Sussex (*Nicholson*).

(8) Var. *roseo-pallescens* Warnst. Tufts a mixture of rose-red and almost white.

Chartley Moss (*Bagnall*); Cockerham Moss, W. Lancs. (*Wheldon & Wilson*); Wolfhole Crag, W. Lancs. (*Wilson*); Middle Hill, Killin (*Cocks*).

(9) Var. *roseum* Warnst. Europ. Torfm. No. 19, 1888. The capitulum and upper part a pale rose- or flesh-colour mixed with a little green.

Widdy Bank Fell, Teesdale, Durham (*Horrell*); Ulpha Moss, Westmoreland (*Ley*); Whixall Moss, Salop (*Ley*); Keston Common, Kent (*Horrell*); White Moss, Hindburn, W. Lancs. (*Wheldon & Wilson*); Foulshaw Moss, Westmoreland (*Stabler, Lett & Waddell*); Upper Roeburndale, W. Lancs. (*Wheldon & Wilson*); Tarnbrook Fell, W. Lancs. (*Wheldon & Wilson*); Allt Dhubh Ghalair, Glen Lochay, Perthshire (*Cocks*).

(10) Var. *versicolor* Warnst. in Bot. Gaz. 1890, 253 (ut var. *læve* f. *versicolor*). Capitula more or less red, in the middle green, and at the base yellowish or whitish.

(11) Var. *violascens* Warnst. Tufts a uniform dark violet.

Witherslack Moss, Westmoreland (*Barnes*); Ulpha Moss, Westmoreland (*Boswell*); Holt, E. Norfolk (*Holmes*).

(12) Var. *virescens* Warnst. in Bot. Gaz. 1890, 254 (ut var. *læve* f. *virescens*). In the entire upper part pale-, grey-, or dark-green, brown, or whitish below.

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var. glauco-purpurascens Russ. 477
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var. purpurascens Warnst. 477
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var. *pallido-glaucescens* Warnst. 219
var. *purpurascens* Warnst. 219
var. *rubrum* Grav. 219
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NOTE ON ERIOCAULON.

By James Britten, F.L.S.

The six species of *Eriocaulon* described by Smith in vol. xiii. of Rees's *Cyclopædia* seem to have been entirely overlooked by subsequent botanists. They are included neither in Steudel's *Nomenclator* nor in the *Index Kewensis;* nor does Körnicke cite them in his monograph in *Linnæa*, xxvii. 560–692 (1854). It seems desirable that these species should be brought into notice, as they involve certain changes in nomenclature which will be the more inconvenient the longer they are postponed; and as the specimens referred to by Smith are in his Herbarium at the Linnean Society and in the National Herbarium, there is no difficulty in placing the species in their proper position.

Smith introduces his descriptions by the following paragraph:—"The following 6 species we believe are hitherto entirely nondescript. They will probably appear, with others, more fully illustrated hereafter from the pen of Mr. R. Brown, when he has time to resume the study of this genus, of which we believe he has ascertained about 30 species. In the meantime, to secure his specific names and our own thus far, we shall attempt definitions of what we have determined from actual observation."

Of the six species, four are Australian. Two are cited from Brown's MSS., one from Solander's, and one is given without any citation and is thus to be credited to Smith himself. The date of this volume of Rees being December, 1809,* the publication here of Brown's names antedates his *Prodromus* (1810), and they must be cited as from the *Cyclopædia*. So far as *E. fistulosum* is concerned, this is the only alteration needed, but the case of *E. depressum* is more complicated. As Bentham points out (*Fl. Austral.* vii. 198), the name *depressum* was first applied (by Banks and Solander and in Brown's MSS.) to the plant which Brown in the *Prodromus* subsequently called *E. deustum*. That this is so is evident from Brown's ticket in the herbarium and from his MSS., as well as from Smith's Herbarium (where Brown has named it) and description, and as a consequence the name must stand as E. DEPRESSUM Br. ex Sm. in Rees Cyclop. xiii. (1809), non Br. Prodr. (1810), taking *E. deustum* as a synonym. *E. depressum* of Br. Prodr. would thus need a name, and would be called E. HETEROGYNUM F. Muell., assuming that Bentham (*l. c.* 197) is right in considering this identical with Brown's plant, as seems to be admitted by Mueller in his *Census* (ed. 2, p. 207).

From the specimens and tickets in the National Herbarium we also learn the identity of *E. nigricans* Br. with the earlier E. PYGMÆUM Soland., which of course must stand. The much later *E. pygmæum* of Körnicke (in Fl. Bras. iii. pt. 1, p. 477) may be called E. KOERNICKEI.

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* See Journ. Bot. 1896, 310.

E. SCARIOSUM of Smith is not the *E. scariosum* of Brown's *Prodromus*, but is the plant there described by him as *E. Smithii*. This again is clear when Smith's Herbarium is consulted, but a specimen of the same plant in the National Herbarium labelled by Brown "*E. scariosum* mscr. nost." at first sight seems to suggest some doubt as to the identity of the species. A reference to Brown's MSS., however, shows that he there entered the plant as "*E. scariosum* Smith"; and the specimen in question is a fragment of Smith's type given by him to Brown—Brown marks it "ex Herb. Smith," and on Smith's sheet is a memorandum, "give Mr. Brown." Smith's name must of course stand, with *E. Smithii* Br. as a synonym; the *scariosum* of the *Prodromus* may be called E. BRUNONIS.

There remain for consideration two African species. That E. LATIFOLIUM Sm. is the plant described forty years later by Bentham in the *Niger Flora* as *E. rivulare* G. Don admits of no discussion, as we have in the National Herbarium specimens of *E. latifolium* Sm. from Afzelius (who according to Brown's MSS. gave the name to the species), and the type of Don's *E. rivulare*.

E. stupeum Sm., from Bourbon, may be referred to E. STRIATUM Lam. Encycl. iii. 275, so far as Lamarck's diagnosis is concerned; his synonymy and part of his detailed description belong to another species, and his figure (t. 50, fig. 1) should also, I think, be excluded. Smith's specimen from Sonnerat has the shorter and more rigid leaves which Körnicke says characterize specimens from Commerson and Thouin; our example from Commerson exactly agrees with Smith's type in these respects.

It may be convenient to tabulate the synonymy resulting from these investigations:—

E. BRUNONIS, nom. nov.
E. scariosum Br. Prodr. 255; Benth. Fl. Austr. vii. 197; et auct.: non Sm.

E. DEPRESSUM Br. MSS. ex Sm. in Rees Cyclop. xiii. (Dec. 1809), non Br. Prodr. 255 (1810).
E. deustum Br. Prodr. 255.

E. FISTULOSUM Br. MSS. ex Sm. in Rees Cyclop. xiii. (Dec. 1809); Br. Prodr. 255 (1810).

E. HETEROGYNUM F. Muell. Fragm. i. 93 (1858).
E. depressum Br. Prodr. 255; Benth. Fl. Austr. vii. 197; et auct.: non Br. ex Sm. in Rees Cyclop.

E. KOERNICKEI, nom. nov.
E. pygmæum Körn. in Fl. Bras. iii. pt. 1, 477; non Sol. nec Dalz. nec Mart.

E. LATIFOLIUM Sm. in Rees Cyclop. xiii. (Dec. 1809).
E. rivulare G. Don ex Benth. in Hook. Niger Flora, 547 (1849); non Dalz.

E. PYGMÆUM Soland. MSS. ex Smith in Rees Cyclop. xiii. (Dec. 1809), non Dalz. nec Mart. nec Körn.
E. nigricans Br. Prodr. 254 (1810); Benth. Fl. Austral. vii. 194.

E. SCARIOSUM Sm. in Rees Cyclop. xiii. (Dec. 1809), non Br. Prodr. 197.
E. Smithii Br. Prodr. 254 (1810).

E. STRIATUM Lam. Encycl. iii. 275 (diagn.) (1789); Körnicke in Linnæa, xxvii. 650.
E. stupeum Sm. in Rees Cyclop. xiii. (1309).

NOTES ON CHANNEL ISLANDS PLANTS.

By C. R. P. ANDREWS, M.A.

Polygala serpyllacea Weihe. Sparingly in the N.E. corner of Guernsey. Not previously recorded in any of the Islands.

Lotus tenuis Waldst. & Kit. Amongst clumps of *Juncus acutus* in marshy ground at Albecq, Guernsey. Not previously recorded in any of the Islands.

Arctium intermedium Lange. Dry ditch, Fort George, Guernsey. Not previously recorded in any of the Islands.

Statice lychnidifolia de Gir. East coast of Alderney, sparingly. Not previously recorded within the limits of the British Flora. A figure and description of this plant will appear later in this Journal.

Mentha pubescens Willd., *α palustris* Sole. Wet meadow near Ivy Castle, Guernsey. Not previously recorded in any of the Islands.

Calamintha Clinopodium Spenn. "Giants' Graves," Alderney. Not previously recorded in any of the Islands.

Calamintha officinalis Moench. var. *Briggsii* Syme. In a hedge near Les Pelleys, Guernsey. I have seen this plant this year in two Guernsey herbaria, dating about 1790 and 1860 respectively. I believe it has only been recorded previously from Devon and Cornwall.

Teucrium Scordium L. Wet meadow near Grandes Rocques, Guernsey, in fair quantity. Mr. Arthur Bennett tells me that it corresponds to the Devonshire form of the plant. The only previous record for the Channel Islands is that of Prof. Lagasca for Jersey, in Babington's *Flora Sarnica*. Like the Professor's records of *Hypericum montanum*, *Senecio paludosus*, *Cyperus fuscus*, &c., this has never been confirmed.

Chenopodium botryodes Sm. In good quantity on the shingle in Lihou Island, off the north-west point of Guernsey. Not recorded previously in any of the Islands.

Orchis pyramidalis L. On page 319 Mr. Stanley Guiton mentions the discovery of one plant in Jersey this summer, and claims that this is the first record for the Channel Islands. The plant occurs in some quantity in Alderney, and is recorded by Mr. E. D. Marquand, in his paper on the Flora of Alderney (reprinted from the *Transactions* of the Guernsey Society of Natural Science for 1899), published last spring.

Phalaris minor Retz. In this Journal for February (p. 33) I

claimed that this grass had a right to be considered as a native of the Channel Islands. This year I have obtained a striking confirmation of this view in the discovery of the herbarium of Joshua Gosselin, whose list of Guernsey plants, compiled in 1790, was published in Berry's *History of the Channel Islands*, 1805. This herbarium is now in the possession of Mr. Edgar Dupuy, The Arcade, Guernsey. On a sheet labelled "*Phalaris canariensis*," I found three specimens of *P. minor* with one of *P. canariensis*. The plant was therefore in the Island more than a hundred years ago, though until last year it was confused with *P. canariensis*, which is really far less common than *P. minor*. The right of the latter to be treated as a native can hardly now be doubted.

Equisetum maximum Lam. Hedge in a wet field-corner, Alderney. The only previous record in the Channel Islands is Prof. Lagasca's for Jersey, which has never been confirmed.

I am indebted to Mr. Arthur Bennett for examining and confirming some of these plants.

MOSSES OF NORTH-EAST YORKSHIRE (V.-C. 62).

By Wm. Ingham, B.A.

The Mosses in this list I gathered during the years 1897–1900. The most interesting habitats I have found to be the siliceous bogs of Strensall Common, Terrington Carr (both now rapidly disappearing as bog-land), and Coatham Marshes. The limestone districts of Castle Howard and Kilburn (the Hambleton Hills) are also interesting. I am much indebted to Mr. H. N. Dixon for kindly verifying all doubtful mosses in the list, and to Dr. Braithwaite, Mr. M. B. Slater of Malton, and Mr. Bagnall for their kind additional help with a few of the more critical mosses.

Sphagnum cymbifolium Ehrh. Strensall Common, Leckby Carr. —Var. *squarrosulum* N. & H. Strensall Common.—Var. *congestum* Schimp. Strensall Common. — *S. papillosum* Lindb. Strensall Common, Kilburn, Askham Bog. — Var. *confertum* Lindb. Strensall Common. — *S. medium* Limpr. Leckby Carr, Sept. 1898.— *S. rigidum* var. *compactum* Schimp. Strensall Common.—*S. tenellum* Ehrh. Strensall Common.—*S. subsecundum* Nees. Strensall Common. — Var. *contortum* Schimp. Strensall Common. — Var. *viride* Boul. Strensall Common.—*S. squarrosum* Pers. Arncliffe Wood, Askham Bog.—Forma *compacta* Strensall Common.—*S. acutifolium* Ehrh. Strensall Common, Pilmoor.—Var. *arctum* Braithw. Strensall Common.—Var. *patulum* Schimp. Strensall Common.—Var. *tenellum* Schimp. Leckby Carr. — *S. fimbriatum* Wils. Strensall Common, Terrington Carr, Askham Bog. — *S. intermedium* Hoffm. Strensall Common, Leckby Carr.—*S. cuspidatum* Ehrh. Strensall Common. — Var. *submersum* Schimp. Top of Hambleton Hills, Kilburn, June, 1899; with habit of var. *Torreyanum* Braithw., *teste* Warnstorf and Horrell.

Tetraphis pellucida Hedw. Strensall Common, Helmsley, Leckby Carr, *c. fr.*—*T. Brouniana* Grev. Mallyam Spout, Goathland.

Catharinea undulata W. & M. Castle Howard, Strensall Common.—Var. *minor* W. & M. Strensall Common.

Polytrichum aloides Hedw. Castle Howard. — *P. urnigerum* L. Strensall Common. — *P. formosum* Hedw. Helmsley, Strensall, Hackness.—*P. piliferum* Schreb. Strensall Common, Kirkham.—*P. juniperinum* Willd. Strensall Common, Kirkham, Kilburn.—*P. strictum* Banks. Pilmoor. — *P. gracile* Dicks. Huntingdon.—*P. commune* L. Terrington Carr. — Var. *minus* Weis. Strensall Common.

Pleuridium axillare var. *strictum* Braithw. Terrington; verified by Dr. Braithwaite.—*P. subulatum* Rabenh. R. Foss, York.

Ditrichum homomallum Hampe. Castle Howard.—*D. flexicaule* Hampe. Kilburn, abundant.

Seligeria pusilla B. & S. Castle Howard, Kilburn.—*S. recurvata* B. & S. Kilburn.—*S. Doniana* C. M. Castle Howard.

Brachyodus trichodes Fürnr. Castle Howard.

Ceratodon purpureus Brid. Moormonkton, Hammerton, Castle Howard, Strensall Common, Askham Bog, Terrington Carr; a marked form. — Near var. *brevifolius* Milde. Coatham Marshes.—*C. conicus* Lindb. Hackness, *c. fr.*, Kilburn, the latter with claret-coloured leaves.

Dichodontium pellucidum Schimp. Lastingham, in abundant fruit; Mallyam Spout, in abundant fruit; Kirkham, Arncliffe Wood.—*D. flavescens* Lindb. Mallyam Spout, *c. fr.*

Dicranella heteromalla Schimp. Kilburn, Strensall Common, Castle Howard, Healaugh, Helmsley, Askham Bog. — *D. varia* Schimp. Saltburn, Helmsley, Scarborough, Strensall Common, Filey.—*D. Schreberi* var. *elatum* Schimp. Terrington.

Blindia acuta var. *trichodes* Braithw. Goathland, in leaf form, being barren.

Dicranoweisia cirrata Lindb. Arncliffe Wood, Castle Howard.

Campylopus pyriformis Brid. Kilburn, *c. fr.*, Strensall Common.—*C. flexuosus* Brid. Strensall Common. — *C. fragilis* B. & S. Kilburn.

Dicranum majus Turn. Helmsley, *c. fr.* — *D. scoparium* Hedw. Goathland, *c. fr.*, Helmsley, *c. fr.*, Castle Howard. — *D. Bonjeani* De Not. Strensall Common, Kilburn, Askham Bog. — Var. *rugifolium* Bosw. Strensall Common. — *D. spurium* Hedw. Strensall Common.

Leucobryum glaucum Schimp. Strensall Common, Hackness.

Fissidens viridulus Wahlenb. Appleton Roebuck, an interesting form in having the border almost obsolete, and yet it is not the var. *Lylei* Wils. — *F. pusillus* Wils. Malton, Castle Howard.—*F. bryoides* Hedw. R. Foss, Kilburn, Kirkham, Clifton, Strensall.—*F. crassipes* Wils. Clifton. — *F. decipiens* De Not. Kilburn.—*F. taxifolius* Hedw. Mallyam Spout, Clifton, Strensall Common.

Grimmia apocarpa Hedw. Kilburn. — *G. pulvinata* Sm. Kilburn, Pickering, Grosmont, Kirkham.—*G. trichophylla* Grev. Arncliffe Wood.

Rhacomitrium aciculare Brid. Kirkham, Hackness, Arncliffe Wood, Mallyam Spout.—*R. fasciculare* Brid. Kirkham.—*R. lanuginosum* Brid. Strensall Common, Coatham Marshes.—*R. canescens* Brid. Kirkham.

Ptychomitrium polyphyllum Fürnr. Kirkham, Coatham Marshes, on block of cinder.

Campylostelium saxicola B. & S. Arncliffe Wood.

Phascum cuspidatum Schreb. Clifton, R. Foss, Castle Howard, Kilburn.

Pottia Heimii Fürnr. Coatham Marshes, very abundant; Thorp Arch (on wall).—*P. truncatula* Lindb. Clifton, Appleton Roebuck.

Tortula pusilla Mill. Kilburn. — *T. rigida* Schrad. Castle Howard. — *T. aloides* De Not. Castle Howard. — *T. marginata* Spruce. Castle Howard. — *T. muralis* Hedw. Kilburn, Kirkham. —*T. subulata* Hedw. Kilburn.—*T. mutica* Lindb. R. Foss, York. — *T. intermedia* Berk. Kilburn, Terrington. — *T. ruralis* Ehrh. Kilburn, Helmsley.—*T. ruraliformis* Dixon. Coatham, Saltburn.

Barbula rubella Mitt. Castle Howard, Coatham Marshes, in abundance. — *B. tophacea* Mitt. Coatham Marshes, in abundance; Scarborough, Saltburn, Askham Bog.—*B. fallax* Hedw. Strensall, Clifton, Lastingham.—Var. *brevifolia* Schultz. Strensall Common, Castle Howard. — *B. recurvifolia* Schimp. Clifton. — *B. spadicea* Mitt. Castle Howard, Saltburn, Mallyam Spout.—*B. rigidula* Mitt. Lastingham, Kilburn. — *B. cylindrica* Schimp. Kirkham, *c. fr.* (young). — *B. vinealis* Brid. R. Foss, York, Boston Spa. — *B. Hornschuchiana* Schultz. Castle Howard, *c. fr.* — *B. revoluta* Brid. Castle Howard. — *B. convoluta* Hedw. Grosmont, *c. fr.*, Arncliffe Wood, Saltburn, R. Foss.—*B. unguiculata* Hedw. Kilburn, Castle Howard.

Weisia microstoma C. M. Kilburn.—Var. *brachycarpum* Schimp. Kilburn. — Var. *obliqua* C. M. Strensall Common. — *W. viridula* Hedw. Kilburn, Castle Howard, Grosmont, Pilmoor, Kirkham, Saltburn.—*W. tenuis* C. M. Boston Spa.—*W. calcarea* var. *viridula* C. M. Castle Howard.—*W. verticillata* Brid. Saltburn.—*W. curvirostris* C. M. Saltburn.

Encalypta vulgaris Hedw. Leckby Carr.—*E. streptocarpa* Hedw. Castle Howard.

Zygodon viridissimus R. Br. Helmsley.

Orthotrichum affine Schrad. Kirkham, Kilburn, Hackness, Saltburn, Helmsley.—*O. leiocarpum* B. & S. Helmsley.—*O. diaphanum* Schrad. Boston Spa, Helmsley, Ouse-bank, York. — *O. Lyellii* H. & T. Hackness. — *O. cupulatum* var. *nudum* Braithw. Boston Spa.—*O. Sprucei* Mont. Clifton.—*O. stramineum* Hornsch. Helmsley.—*O. pulchellum* Sm. Saltburn.

Ulota Bruchii Hornsch. Helmsley. — *U. crispa* var. *intermedia* Dixon. Castle Howard, Helmsley.—*U. phyllantha* Brid. Saltburn.

Physcomitrium pyriforme Brid. Terrington Carr.

Funaria hygrometrica Sibth. Askham Bog, Strensall. Coatham Marshes, Thorparch, Castle Howard (approaching var. *calvescens* B. & S.).

Amblyodon dealbatus P. B. Coatham Marshes, in great abundance.

Aulacommium palustre Schwaegr. Terrington Carr, *c. fr.*, Strensall.

Philonotis fontana Brid. Clifton Ings, Strensall, the latter approaching var. *adpressa* Ferg.—Probably var. *pumila* Dixon. Mallyam Spout.

Leptobryum pyriforme Wils. Malton. — Var. *minus* Limpr. Coatham Marshes.

Webera nutans Hedw. Strensall Common, Askham Bhg.—Var. *longiseta* B. & S. Leckby Carr. — *W. carnea* Schimp. Kilburn, Arncliffe Wood, *c. fr.* — *W. annotina* Schwaegr. Saltburn, Castle Howard.—*W. albicans* Schimp. Strensall Common.

Plagiobryum Zierii Lindb. Kilburn.

Bryum lacustre Brid. Coatham Marshes. — *B. Marratii* Wils. Coatham Marshes. — *B. calophyllum* R. Br. Coatham Marshes.—*B. pendulum* Schimp. Coatham Marshes, Saltburn.—*B. Warneum* Bland. Coatham Marshes. — *B. intermedium* Brid. Coatham Marshes.—*B. bimum* Schreb. Strensall Common, Askham Bog.—*B. cæspiticium* L. Kilburn, Terrington Carr. — Var. *badium* Brid. Arncliffe Wood; verified by Dr. Braithwaite and Mr. Dixon.—*B. argenteum* L. Castle Howard, Coatham Marshes. — *B. pallens* Sw. Strensall Common, Scarborough, Askham Bog, Lastingham. —*B. capillare* L. Kirkham, Terrington Carr, Castle Howard.—*B. obconicum* Hornsch. Terrington Carr. — *B. roseum* Schreb. Castle Howard.

Mnium serratum Schrad. Thorparch, *c. fr.* — *M. hornum* L. Strensall, in abundant fruit; Arncliffe Wood, Askham Bog.—*M. affine* Bland. Clifton Ings, probably var. *rugicum* B. & S.—Var. *elatum* B. & S. Askham Bog.—*M. undulatum* L. Castle Howard, *c. fr.*, Thorparch, *c. fr.* — *M. punctatum* L. Strensall, Kilburn, Castle Howard, Clifton Ings, Kirkham.

Fontinalis antipyretica L. Kirkham, Askham Bog.

Neckera crispa var. *falcata* Boul. Kilburn. — *N. complanata* Hüben. Helmsley.

Homalia trichomanoides Brid. Castle Howard, *c. fr.*

Leucodon sciuroides Schwaegr. Helmsley.

Porotrichum alopecurum Mitt. Helmsley, Arncliffe Wood, Kirkham, Thorparch.

Leskea polycarpa Ehrh. R. Foss, York. — Probably var. *tenella* B. & S. or very near it. Arncliffe Wood.

Anomodon viticulosus H. & T. Malton, Castle Howard.

Thuidium tamariscinum B. & S. Castle Howard, Strensall, Askham Bog.—*T. recognitum* Lindb. Castle Howard.

Climacium dendroides W. & M. Castle Howard, Askham Bog.

Isothecium myurum Brid. Hackness, Kilburn, Castle Howard, Kirkdale.

Pleuropus sericeus Dixon. Helmsley, Kilburn, Castle Howard.

Camptothecium lutescens B. & S. Kirkby Moorside.

Brachythecium albicans B. & S. Saltburn, Kilburn, Strensall, Coatham Marshes, *c. fr.* — *B. rutabulum* B. & S. Castle Howard, Grosmont, Strensall, Kirkham, Coatham Marshes, Saltburn.—Var. *robustum* B. & S. R. Foss, York.—Var. *longisetum* B. & S. Stren-

sall Common. — *B. virulare* B. & S. Castle Howard, Mallyam Spout, Kilburn. — Intermediate between type and var. *latifolium* Husn. Mallyam Spout.—*B. velutinum* B. & S. Kilburn, Helmsley, Colton. — *B. plumosum* B. & S. Goathland. — *B. purum* Dixon. Strensall, Castle Howard, *c. fr.*

Hyocomium flagellare B. & S. Kilburn, small form; Mallyam Spout.

Eurhynchium piliferum B. & S. Bolton Percy. — *E. prælongum* B. & S. Helmsley, Strensall, Askham Bog, Kirkham, Saltburn, Healaugh, Coxwold, *c. fr.*, Tockwith, *c. fr.*, Mallyam Spout, Castle Howard. — *E. speciosum* Schimp. Clifton Ings. — *E. pumilum* Schimp. Healaugh. — *E. Swartzii* Hobk. Castle Howard, *c. fr.*, dark green; Clifton Ings, *c. fr.*, pale green; Strensall, yellowish; Boston Spa, large form. — *E. abbreviatum* Schimp. Healaugh.— Var. *rigidum* Boul. Kirkdale Cave. — *E. myosuroides* Schimp. Kirkdale, Arncliffe Wood, *c. fr.* — Var. *cavernarum* Mol. Kirkdale. — *E. striatum* B. & S. Hackness, Hessay. — *E. rusciforme* Milde. R. Foss, York, Castle Howard, Helmsley, Kirkham. — *E. murale* Milde. Castle Howard, Helmsley, Malton, R. Foss, Kilburn, Kirkham. — Var. *julaceum* Schimp. Kirkdale. — *E. confertum* Milde. Helmsley, Boston Spa.

Plagiothecium depressum Dixon. Kirkdale Cave, Castle Howard. — *P. Borrerianum* Spruce. Heworth (York); Castle Howard; Goathland, large form; Arncliffe Wood, large form. — *P. denticulatum* B. & S. Askham Bog, Kilburn, Strensall, Saltburn. — Var. *densum*, c. fr. (short and striate), Kilburn. — Var. *majus* Boul. Tockwith, *c. fr.*, Huntingdon. — *P. sylvaticum* B. & S. Kilburn, a very short form; Helmsley, *c. fr.*, Castle Howard. — *P. undulatum* B. & S. Arncliffe Wood, *c. fr.*, Castle Howard.

Amblystegium serpens B. & S. Askham Bog, Castle Howard, R. Foss, Coatham Marshes, Helmsley, Kirkdale, Saltburn, Scarborough.—*A. varium* Lindb. Clifton Ings, *c. fr.*, R. Foss, Askham Bog, *c. fr.* — *A. irriguum* B. & S. Saltburn, *c. fr.* — *A. filicinum* De Not. Helmsley, Saltburn, R. Foss, Castle Howard (approaching var. *gracilescens* Schimp.), Clifton Ings, Strensall.—Var. *Valliselausæ* Dixon. Helmsley.—*A. Kochii* B. & S. Clifton Ings.—*A. Juratzkæ* Schimp. Appleton Roebuck, Lastingham, Healaugh, Askham Bog.

Hypnum riparium L. Castle Howard, Clifton Ings, Askham Bog, R. Foss, Saltburn, Kilburn. — Var. *longifolium* Schimp. Healaugh, *c. fr.*, R. Foss.—Var. *abbreviatum* Schimp. Clifton Ings. —*H. polygamum* Schimp. Pilmoor.—*H. stellatum* Schreb. Strensall, Heworth, Kilburn.—Var. *protensum* B. & S. Scarborough.—*H. chrysophyllum* Brid. Strensall. — *H. Sommerfeltii* Myr. Terrington Carr, in abundant fruit; Thorparch. — *H. elodes* Spruce. Strensall Common. — *H. aduncum* Hedw. Askham Bog, Coatham Marshes. — Var. *intermedium* Schimp. Strensall Common. — Var. *paternum* Sanio. Strensall Common. — Var. *gracilescens* Schimp. Clifton Ings, Strensall Common. — Group *Typicum*, forma *falcata* Sanio. Coatham Marshes.— *H. lycopodioides* Schwaegr. Pilmoor, Strensall.—*H. fluitans* L. Strensall, Terrington Carr.—Var. *Arnellii* Sanio. Strensall, Terrington Carr. — Group *obsoletum*. Arncliffe

Wood, with nerve often forking.—*H. examulatum* Gümb. Strensall, Terrington Carr, Pilmoor. — Marked form, approaching var. *stenophyllum* Hobk. Pilmoor. — Var. *stenophyllum* Hobk. Strensall.—*H. uncinatum* Hedw. Hackness. — Var. *plumosum* Schimp. Saltburn.—*H. intermedium* Lindb. Strensall Common.—*H. commutatum* Hedw. Castle Howard, Kirkham, Goathland, *c. fr.* — *H. falcatum* Brid. Mallyam Spout. — Var. *virescens* Schimp. Helmsley (Beck Dale).— *H. incurvatum* Schrad. Terrington.— *H. cupressiforme* L. Castle Howard, Strensall, Kirkham, Arncliffe Wood, Helmsley.— Var. between var. *lacunosum* Brid. and var. *elatum* Schimp. Strensall. — Var. *filiforme* Brid. Castle Howard, *c. fr.*, Saltburn, Arncliffe Wood, *c. fr.* — Var. *minus* Wils. Castle Howard. — Var. *longirostre* Schimp. Kilburn, *c. fr.* — Var. *resupinatum* Schimp. Goathland. — Var. *elatum* B. & S. Kilburn, one fruit. — Var. *lacunosum* Brid. Strensall. — *H. imponens* Hedw. Strensall Common. — *H. Patientiæ* Lindb. Strensall Common. — *H. molluscum* Hedw. Strensall, Arncliffe Wood. — Var. *fastigiatum* Bosw. Kilburn (Hambleton Hills).—*H. palustre* L. Saltburn, Castle Howard, Kilburn, Clifton. — *H. ochraceum* Turn. Arncliffe Wood, *c. fr.*— Var. *flaccidum* Milde. Arncliffe Wood. — *H. cordifolium* Hedw. Askham Bog, Strensall, R. Foss (York). — *H. giganteum* Schimp. Strensall Common, Pilmoor (male plant), Askham Bog.—*H. cuspidatum* L. Askham Bog, *c. fr.*, Strensall, *c. fr.*, Helmsley, Pilmoor, Saltburn, Kirkham, Clifton Ings, Kilburn.—Very near var. *pungens* Schimp. Saltburn Wood. — *H. Schreberi* Willd. Strensall, Askham Bog.

Hylocomium squarrosum B. & S. Strensall, Askham Bog, Castle Howard, R. Foss (York).—*H. triquetrum* B. & S. Helmsley, *c. fr.*, Strensall.—*H. splendens* B. & S. Askham Bog.

ROBERT MORGAN.

It is with great regret that we announce the death of one whose name has been familiar to readers of this Journal for nineteen years, and whom it will be difficult to replace. It was in February, 1882, that "Robert Morgan del. et lith." first appeared on one of our plates, and from that time it has rarely been absent from the Journal.

Robert Morgan was born at Norwood on the 9th of May, 1863, and early evinced a taste for drawing. A member of the Presbyterian congregation to which Mr. Carruthers, then Keeper of the Department of Botany, belonged, his father brought the qualifications of the lad, on his leaving school, under his notice; and Mr. Carruthers gave him that encouragement to which many since well-known in botanical circles, either as artists or observers, have acknowledged their indebtedness. Robert drew plants in the field, and studied the excellent series of lessons by W. H. Fitch published in the *Gardeners' Chronicle*. He obtained work in connection with the plates illustrating the voyage of the 'Challenger,' and

became acquainted with Mr. Percy Highley, who rendered him much assistance.

Robert Morgan's first botanical plate was the one already mentioned, and it is with his botanical work that we are here concerned. This, however, formed but part of his undertakings; numerous works dealing with entomology—among them Fowler's Coleoptera and Barrett's Lepidoptera—were illustrated by him. Morgan's work was characterized as a whole by conscientiousness and accuracy rather than by genius, unless we accept the definition that genius is "an infinite capacity for taking pains," in which case he may lay claim to that gift. Another qualification he had which only those who employ draughtsmen can estimate at its proper value; he could be depended upon to complete punctually any work which he undertook. A considerable number of his plates will be found in the Transactions and Journal of the Linnean Society (of which body he became a Fellow in 1887), among the best of these being the figures of Milanji plants published in 1894; these were both drawn and lithographed by Morgan; he also lithographed all the plates illustrating Trimen's *Flora of Ceylon*. His most recent work was the reproduction, for the *Botany of Cook's First Voyage*, of two or three of Sydney Parkinson's drawings of Banks's Australian plants: these are admirably executed, and it might be wished that the whole could have been thus reproduced.

It might, indeed, perhaps be said that Morgan was better at interpreting other people's work than in original execution, were it not for the masterly drawings of *Potamogeton* which accompany Mr. Fryer's monograph of the British species of that genus, now in progress, of which, happily, all the plates but three have been drawn. Mr. Fryer had the highest opinion—and no better can be obtained—of Morgan's work, and has expressed it from time to time in the pages of this Journal, where his letterpress accompanied Morgan's drawings. In this genus alone did I ever hear Morgan express interest; he was always glad when I told him a "Pot" was wanted, and put his best work into the plate. Naturally, therefore, he was able to display his capabilities to greater advantage on the quarto plates of Mr. Fryer's book, and it may be doubted whether these have ever been surpassed, either in accuracy or elegance. He went to Chatteris to draw some of the plants, and the original sketches for the plates will ultimately be placed by Mr. Fryer in the Department of Botany; and Mr. Fryer allows me to quote from a letter received from him on the occasion of Morgan's death the following reminiscence of his visit, which is the more interesting on account of the appreciation of character which it contains:—

"Mr. Morgan spent some days with us to learn what was required in the illustrations of our book; he at once found his way to our hearts. Simple, unassuming, with almost boyish high spirits, controlled in all things by early religious training, always deferring everything to duty, he refused every relaxation until his long day's work was done. And his working hours *were* long, almost all the

summer daylight would allow. Then in the twilight time, a short walk, or a run on his cycle, stood for the recreation of a man on his holiday! His visit was intended for a holiday, for all I could teach him could be taught in a few hours, and then I wished to show him the beauties of the lowland landscape; but no—we only had a walk to the nearest drain, one evening, so that he might see how Potamogetons looked in their native waters, and one whole day at Sandringham—all the rest of his time here was spent over his drawing-board. He liked drawing from the living plants, and wished to avail himself of the opportunity of doing so to the fullest extent. Seeing his enthusiasm, I was unwilling to thwart him,

although I saw it would delay and to some extent injure our projected work. He often said in his letters that he liked drawing Potamogetons better than any other subjects, and wished his life's work could be wholly occupied with them. No wonder, for the plates in our book have never been equalled. This is not merely the prejudiced opinion of a friend, but that of botanists and artists who admire them even more than I do—I who know how far Morgan could have surpassed them if he had worked under more favourable conditions."

Morgan had been so lately working in the Department of Botany that it came as a shock to us to learn that he was in hospital, and had undergone an operation for appendicitis. The operation was successful, but other complications supervened, which terminated in his death in St. George's Hospital on the 6th of November. Pleasant in manner, of refined and quiet tastes—he was a violinist

of no mean ability—conscientious in his work, always ready to be helpful even in matters outside his profession, he will be greatly missed whether by those who knew him as artist or man; and his loss leaves a blank which will not easily be filled.

The portrait accompanying this notice is from a photograph taken in the early summer of this year.

JAMES BRITTEN.

BIBLIOGRAPHICAL NOTES.

XXV.—AUBERT DU PETIT-THOUARS.

MR. B. B. WOODWARD'S interesting article (pp. 392–400) on Aubert du Petit-Thouars fairly raises the question of date for several of the works dealt with. The work no. 2 in Mr. Woodward's list (p. 394), "Plantes des îles de l'Afrique australe formant des genres nouveaux . . ." or alternative titles, 4to, Paris, 1804–1807, contained twenty-four plates (exclusive of two plates of *Cycas*), and was issued, or re-issued, as stated by Mr. Woodward, in four fascicles. De Theis, Glossaire de Botanique, 8vo, Paris, 1810, quoted most of the genera according to their fascicles; also Pfeiffer, Nomencl. Bot. (1873–74), quoted all the genera according to their fascicles and dates; there is a little discrepancy between these two authorities. Jaume St. Hilaire, Expos. Fam. Nat. ii. Suppl. (1805), quoted the first eight of the genera figured on the twenty-four plates; he also supplied specific names to the plants figured, most of which names are not contained in the Kew Index. A consideration of all the evidence gives the probable dates and fascicles of the twenty-four plates, as follows:—

tt. 1–4, 1804; fasc. i.
tt. 5–8, 1804; part of fasc. ii.
tt. 9–12, 1805; part of fasc. ii.
tt. 13–18, 1806; fasc. iii.
tt. 19–94, 1807; fasc. iv.

tt. 1–8 and the two plates of *Cycas* were included in livraison i., tt. 9–18 were intended to make up livraison ii., and tt. 19–24 to belong to livraison iii. See Pet.-Th. Mélanges, Discours préliminaire, p. 5 (1811).

Besides the twenty-four plates illustrative of new genera and the two plates of *Cycas*, there appeared six plates, numbered 25–30; they were issued as an additional fascicle or livraison, and are apparently the six plates referred to and announced with the text for sale in Pet.-Thouars, Rev. Gén. Mat. Bot. p. 5 (1819). These plates are shaded in lithograph, and in the Kew (Bibl. Hook.) copy they are lettered with the names on the plates, as follows:—

Pl. xxv. HARONGA ovata
Pl. xxvi. OCHROCARPOS
Pl. xxvii. BRINDONIA oxycarpa
Pl. xxviii. CEREA radicans
Pl. xxix. ARDINGHELLA
Pl. xxx. HEMISTEMA Aubertii *Decand.*

The corresponding text is not found in the Kew volume; neither the plates nor text are mentioned in Pritzel's *Thesaurus*.

T. 25: HARONCA is obviously a mistake for HARONGA; the latter name occurs at the foot of the text, p. 72, at the end of the description of 24. *Chrysopia fasciculata*, indicating the first word to follow; the genus *Haronga* is described in the Nova Genera Madagascariensia, n. 49. The plate represents *Harungana paniculata* Pers. (*Arungana*) (1806); *Haronga madagascariensis* Choisy. The name *Haronga ovata* does not occur in the Kew Index.

T. 26 represents apparently *Ochrocarpos Goudotianus* Planch. & Triana in Ann. Sci. Nat. sér. 4, xiv. p. 365 (1860) (*Ochrocarpus*).

T. 27 is the same as Sieber, Exsicc. Fl. Maurit. ii. n. 262, and is *Garcinia indica* Choisy in DC. Prodr. i. p. 561 (1824); Vesque, Monogr. Guttif. pp. 423, 656 (1893).

The name *Brindonia oxycarpa* does not occur in the Kew Index.

T. 28: the genus *Cerea* is not recorded in the Kew Index; the plant is an *Elæocarpus*, and apparently the species is *E. grandiflorus* Bojer, Hort. Maurit. p. 45 (1837); Baker, Fl. Maurit. & Seych. p. 33 (1877); non Sm. in Rees, Cyclop. vol. xii. sp. nº. 5 (1809); it may now be called *E. radicans*.

T. 29 is probably *Ochrocarpus angustifolius* Vesque, *l. c.* p. 524; *Mammea? angustifolia* Planch. & Triana, *l. c.* xv. p. 246 (1861). It does not belong to *Ardinghelia* Commers. ex Adr. Juss. Tent. Euphorb. p. 21, t. 4, fig. 14 (1824), which is a section of *Phyllanthus*.

T. 30 is *Hemistemma Aubertii* DC. Regn. Veg. Syst. Nat. i. p. 413 (1818), and Prodr. i. p. 71.

The work no. 6 (p. 394), "Genera nova Madagascariensia . ." 8vo, is usually regarded on the authority of Pritzel to belong to the date of 1806; but, as Mr. Woodward suggests, this date is doubtful; indeed, an entry of it in the catalogue of books in the Berlin Botanical Museum gives the date of 1804, but Dr. Otto Kuntze, Rev. Gen. Pl. i. p. cxxvii (1891), failed to find the book in the Museum, and he therefore discarded the earlier date. The work was composed in 1796; see Pet.-Thouars, Mélanges, Discours préliminaire, pp. 8, 9 (1811), but it seems not to have been printed until many years afterwards; none of the names are quoted from it in Pers. Syn. Pl. ii. (1806–1807), although Persoon, *l. c.* ii. p. 588 (1807) under *Hecatea* quotes "A. du Petit-Thouars, Pl. ins. Afr. austr. p. 27, t. 5"; and I am unable to find any mention of it made by any author or noticed in any publication before 1808; it is possible that the dates of 1804 and 1806 may have been attributed to it by confusion with the work no. 2, previously discussed, on account of the occurrence in the title of the words "genres nouveaux." The following register of Milititz, Handb. Bot. Lit. column 196 (1829), which is referred to by Mr. Woodward, appears accurately to supply the date:—"1808.—Genera nova Madagascariensia secundum methodum Jussieuanam disposita. *Par.* 8, p. 29 (*R.* Götting. gel. Anz. 1808. ii. 1144)." About the same time the work was published in J. J. Roemer, Collect. Bot. pp. 195–218, 4to, Zürich, as stated by Mr. Woodward; in this

publication there are found a few differences or misprints which do not occur in the octavo edition—for instance, the no. 3, *Ouviranda*, on p. 196, is printed instead of *Ouvirandra* of p. 2 in the octavo edition; at the end of the account of no. 38, p. 204, *Siburatia*, the synonym "Maesa, Forskæl" is given, whereas in the octavo edition, p. 12, it is "Maesa, Forschal"; the name of no. 41, *Dicophe*, on p. 205, is an error for *Dicoryphe*, as it correctly appears on p. 12 of the octavo edition; and no. 74, *Trilepsium*, on p. 212 of the quarto edition, is *Trilepisium* on p. 22 of the octavo edition. No. 86 is wanting from both editions; both editions under no. 70 quote *Bruguiera*, A. P. Dict. Sc. Nat. [v. p. 375 (1806)]; and under no. 66, *Paropsia* Nor., both editions quote "Nov. Gen. Tab. xix.," referring doubtless to the work Plantes des îles, the date of t. 19 of which has been previously given as 1807.

There is also some doubt as to the date of publication of J. J. Roemer's Collect. Bot.; the title-page of the book contains the date 1809, but Miltitz, *l. c.* col. 109, registers it as follows:—"1807. Roemer (Joa. Jac.): Collect. ad omnem rem botanicam spectantia. Partim e propriis, partim ex amicorum schedis manuscriptis concinnavit et edidit. *Turici*, 4. c. tab. æn. 4, p. 314. (3 Thl. 10 gr.)

(*R.* Allg. Hall. Lit. Zeit. 1810. Nr. 282—Heidelb. Jahrb. III Jahrg. 1 Heft.)"

The *Collectanea* apparently extended over three years, and not improbably the part containing Petit-Thouars' *Nova genera madagascariensia* was published in 1808. It is not certain that the octavo edition (of 1808,) of which the quarto edition was a reprint (see Petit-Thouars, Mélanges, Disc. prélim. p. 19), was ever published until it appeared in the *Mélanges* in 1811.

W. P. Hiern.

SHORT NOTES.

Castanea sativa Mill.—I do not know whether Messrs. Hanbury and Marshall's opinion (as expressed in their *Flora of Kent*) concerning the propagation of this tree is shared by others, but as such a statement, occurring in so excellent a work, is certainly due to imperfect observation, it may be as well to correct it. The authors remark of the Spanish Chestnut: "Frequently planted in woods and copses, but apparently never reproducing itself from seed." I have paid some attention to *Castanea sativa* as we find it growing in parks and plantations, and during the past two years have in the autumn frequently found abundance of ripe fruit where chestnut trees grow. Previously I had entertained the opinion that fruit was rare. Chestnuts, brought from a Surrey copse, have in my possession developed into vigorous plants. The reason, no doubt, why seedling chestnut trees are seldom seen where *C. sativa* is planted is that the chestnuts have a market value, and are seldom allowed to lie about for long. In a Midhurst guide-book it is stated that from the celebrated avenue of chestnut trees in Cowdray Park

several bushels of chestnuts are annually sent to the London market. I have noticed seedling chestnut trees during the past year growing in Kent, Surrey, Sussex, and a few years ago in Hants, in all cases in the vicinity of adult chestnut trees, and evidently originating from chance-sown seeds.—C. E. Britton.

Polygonum Deasyi Rendle.—This name must be substituted for *P. tibeticum* Rendle (p. 428). I regret having overlooked the earlier *P. tibeticum* Hemsl. in Hook. Icon. No. 2471 (1896), a very different plant (section *Aconogon*), collected by Dr. Littledale.—A. B. Rendle.

Fumaria muralis Sonder in Worcestershire. — A plant of this species was gathered by Mr. W. J. Rendall in arable land at Malvern on October 4th, and I found another example in an open place in Dripshill Wood a week later.—Richard F. Towndrow.

Cinclidotus fontinaloides var. pseudo-aquaticus mihi.—I found this moss on a wall in a recess close by a waterfall at Hawes, in Wensleydale, v.-c. 65, on July 26th, 1900. Mr. Bagnall says it is evidently a variety of *C. fontinaloides*, and suggests the name "*pseudo-aquaticus*." Dr. Braithwaite says:—"From its narrow leaves it has a different aspect, and the name as a variety is applicable." Mr. Dixon says: "I have not any form of *Cinclidotus fontinaloides* with the leaves at all like yours, and the name *pseudo-aquaticus* seems applicable."—*Cinclidotus fontinaloides* var. *pseudo-aquaticus*, n. var. Tufts brown below, and dark green above; stems and branches variously curved; leaves narrow, tapering, and rigid with acute points; nerve very strong and broad.—Wm. Ingham.

Weisia rupestris var. humilis mihi. — Mr. Bagnall strongly recommends me to publish this new variety. I found it growing on the bank of the United Kilhope and Welhope burns, branches of the R. Wear at Wearhead, on July 27th, 1898. Mr. Bagnall regards it as a much better marked variety than the var. *intermedia* Jack, or certain other varieties that have been named.—*Weisia rupestris* var. *humilis*, n. var. Growing on bare ground in very compact tuft; plants dwarf; leaves remarkably narrow and acute; areolation *pellucid* throughout the leaf; a very small but very pretty little plant.—Wm. Ingham.

Hieracium rigidum in Worcestershire.—I gathered on July 21st, 1898, and again this year, specimens of a *Hieracium* which Mr. F. J. Hanbury determines to be a form of *H. rigidum* Hartm. They were collected from a hedge-bank at Leigh Sinton, near Malvern, which some forty years ago formed the boundary of a coppice, since ploughed up and turned into arable land. The very few remaining plants seem to be in danger of extermination by other species.—Richard F. Towndrow.

Rubi of Wandsworth Common.—In July last I had the pleasure of a brief visit from the Rev. W. Moyle Rogers, for the purpose of a further batological exploration of Wandsworth Common than he had already made; he had spent two or three hours on the Common in 1899. From his observations on the two occasions, and his determination of a few herbarium specimens of my own representing

gatherings of 1885, the following list of *Rubi* has been drawn up. The notes are in all cases Mr. Rogers's :—*Rubus Idæus* L.—*R. lasioclados* Focke, var. *angustifolius* Rogers. — *R. echinatus?* Lindl. — *R. Babingtonii* Bell Salter. — *R. rosaceus* W. & N. A very strong form of the large aggregate *R. rosaceus* W. & N. It is very near to, if not identical with, the form for which Mr. Druce in his Fl. Berks suggests the varietal name *bercheriensis*, and a near ally of var. *hystrix*. Yielding to Mr. Rogers's fuller study of the genus, Mr. Druce acquiesces in his opinion that *bercheriensis* is scarcely entitled to varietal rank. — *R. dasyphyllus* Rogers = *R. pallidus* Bab., not W. & N.—*R. dumetorum* W. & N. var. *britannicus* Rogers. Perhaps not quite typical, but better under var. *britannicus* than under var. *ferox*, to which it makes some approach. — *R. corylifolius* Sm. var. *sublustris* Lees.—Var. *cyclophyllus* Lindeb.—*R. imbricatus* Hort. A remarkable form. On Putney Common I have seen together with it both the typical plant and an intermediate form.—*R. carpinifolius* W. & N. Very abundant. — *R. incurvatus* Bab. — *R. Lindleianus* Lees. — *R. erythrinus* Genev. forma *glandulosa*. — *R. rhamnifolius* W. & N.—*R. Bakeri* F. A. Lees.—*R. pulcherrimus* Neum. Common. —*R. argentatus* P. J. Muell., var. Very abundant. — *R. rusticanus* Merc.—*R. rusticanus* Merc. *flore pleno*. For a number of years this very beautiful "double" bramble, in which all the stamens are converted into petals, has been known on the Common—three bushes of it—on that margin which forms one side of Dorlcote Road, College Park. To all appearance the bushes are quite wild, and they are found in a line with others of the common *rusticanus* type. The variety is, however, unrecorded as wild, but it is grown by floriculturists for shrubbery planting. I recently ascertained that, before the College Park roads were laid out and houses erected, twelve to fourteen years ago, a nursery garden existed on the site of Dorlcote Road, hedged off from the Common at the line of private ownership ; and my informant—who had been an *employé* in the garden—remembered this bramble as one of its specialities. Its presence on the Common is thus fully explained. I have since seen a large clump of the same form in Kew Gardens, under the name *R. ulmifolius* var. *flore pleno*.—William Whitwell.

Koeleria cristata. — When at the Lizard, Cornwall, early in June, this year, I came across a considerable patch of a grass allied to *Koeleria cristata*, though with marked characteristics of its own. Mr. Arthur Bennett, who has kindly examined the plant, believes that it is the variety *villosa* Lloyd, Fl. de l'Ouest de la France (4th ed. 1886, p. 403).—W. F. Miller.

Introductions.—In a potato-field near Edinburgh I gathered in August a fine plant of *Melilotus sulcata* Desf. Another alien, which I found in considerable plenty on waste ground, Tunbridge Wells, is *Potentilla recta* L., recorded in the *Flora of Kent* for two localities, but in different parts of the county.—W. F. Miller.

*ARTICLES IN JOURNALS.**

Bot. Centralblatt. (Nos. 44, 45).—L. Hering, 'Zur Anatomie der monopodialen Orchideen' (3 pl.). — (No. 44). A. J. M. Garjeanne, 'Zur Kenntniss monströser *Bellis*-köpfchen.' — (No. 46). W. Busse, 'Zur Kenntniss des Leitgewebes in Fruchtknoten der Orchideen.' — W. Taliew, 'Ueber die russischen myrmecophilen Pflanzen.' — (Nos. 47, 48). L. Cador, 'Anatomische Versuchung der Mateblätter.'—(No. 48). B. Fedtschenko, 'Über einige *Hedysarum*-Arten.'

Bot. Gazette (15 Oct.).—R. A. Harper, 'Cell and nuclear division in *Fuligo varians*' (1 pl.). — W. J. G. Land, 'Double fertilization in *Compositæ*' (2 pl.). — M. Hefferan, 'A new chromogenic *Micrococcus*.'—E. R. Hodson, *Neovossia Iowensis*, sp. n.

Bull. Torrey Bot. Club (July). — D. S. Johnson, 'Development of *Saururus cernuus*' (1 pl.). — E. P. Bicknell, *Hydastylus* (= *Sisyrinchium californicum* and allies). — K. M. Wiegand, *Saxifraga* and *Primula*.—C. V. Piper, 'New North Western Plants.'—H. Hasselbring, *Globulina antennariæ*, sp. n.—("August": = 6 Sept.). R. M. Harper, 'Flora of South Georgia.'—E. L. Salmon, '*Erysiphaceæ* of Japan' (1 pl.). — A. McComb, 'Development of karyokinetic spindle in vegetative cells of higher plants' (2 pl.). — (26 Oct.). K. M. Wiegand, '*Juncus tenuis* Willd.'—P. A. Rydberg, 'Rocky Mountain *Melanthaceæ*.'—N. L. Britton, 'Torrey as a botanist' (bibliography). —(14 Nov.). J. B. Ellis & J. M. Everhart, 'New Fungi.'—W. H. Long, 'Fungi of Austin, Texas.' — J. H. Barnhardt, 'Heteromorphism in *Helianthemum*.'

Gardeners' Chronicle (3 Nov.).—*Mormodes Oberlanderianum* Lehm. & Kränzl., sp. n. (fig. 96). — (10 Nov.). *Helichrysum Gulielmi* (fig. 103). — E. A. Bowles, *Crocus niveus*, sp. n. — W. G. Smith, 'Abnormal growth of *Agaricus albus*' (fig. 104). — (17 Nov.). *Lysionotus carnosa* Hemsl., *Passiflora europhylla* Mast., spp. nn.

Journ. Linn. Soc. (xxxiv, no. 241; 1 Nov.). — E. S. Barton, '*Halimeda* from Funafuti' (1 pl.). — O. Stapf, '*Dicellandra* and *Phæoneuron*' (1 pl.).

Malpighia (xiv, fasc. 1–4; received 9 Nov.). — E. Chiovenda, 'Contributo alla Flora Mesopotamica.' — O. Mattirolo, 'Gli Ipogei di Sardegno e di Sicilia' (1 pl.). — L. Petri, 'Gasteromiceti di Borneo' (3 pl.: *Clathrogaster*, gen. nov.). — A. Baldacci & P. A. Saccardo, 'Onorio Belli e Prospero Alpino.' — A. Noelli, 'Infiorescenza anomala di un' *Orchis*' (1 pl.).—G. Capeder, '*Lithothamnion*' (1 pl.).—J. Zodda, *Ophrys Nicotræ*, sp. n. (1 pl.).

Mém. de l'Herb. Boissier (15 Nov.). — R. Schlechter, 'Monographie der *Podochilinæ*.' — A. Minks, 'Der Flechtengattung *Omphalodium*.'

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* The dates assigned to the numbers are those which appear on their covers or title-pages, but it must not always be inferred that this is the actual date of publication.

Oesterr. Bot. Zeitschrift (Nov.). — K. Fritsch, '*Lathyrus*.' — E. Palla, '*Pilobolus*-Arten' (1 pl.). — J. Freyn, 'Flora von Steiermark' (cont.: *Sedum* and *Saxifraga*). — J. Velenovský, 'Die Achselknospen der *Carpinus*.'—L. Sarnthein, 'Pilzflora von Tyrol.'

Rhodora (Nov.).— C. W. Bissell, 'Abnormal flowers in *Leonurus Cardiaca*.'

Trans. Linn. Soc. (2nd Ser.: vol. v. part 13). — A. B. Rendle, 'Supplementary Notes on *Najas*.' — (part 14). W. C. Worsdell, 'Comparative anatomy of *Encephalartos*' (1 pl.).

BOOK-NOTES, NEWS, &c.

Dr. C. A. M. Lindman, of the Swedish Regnell Expedition to Brazil, 1892–4, has recently published some interesting and valuable results obtained in the course of his travels. In "Vegetationen i Rio Grande do Sul" (Stockholm: Nordin & Josephson, 1900) we have a series of sixty-nine sketches, mostly clever reproductions from photographs, with accompanying letterpress to illustrate the botanical topography of the southern extremity of Brazil and the neighbouring districts in Uruguay and the Argentine Republic. The series, which is admirably complete and presented with much judgment, is designed to give the reader a good idea of South American subtropical vegetation, and does this with conspicuous success. "Beiträge zur Palmenflora Südamerikas" (extr. from the K. Svenska Vet-Akad. Handlingar, Band 26) records the careful study of a difficult natural order of plants. The memoir is capitally illustrated with five double plates, besides several photographs, and, while treating of the same subject as that upon which Dr. Barbosa Rodriguez recently wrote (*vide* Journ. Bot. 1898, p. 355), and based upon material collected largely in the same districts, still adds considerably to our knowledge of South American Palms. Another memoir from the same pen is "Några bilder från den sydamerikanska vildmarken el gran chaco" (extr. from Tidsk. af svenska sällskapet för antropologi och geographi, 1899), which, besides illustrating and describing the botanical topography of the Gran Chaco, that little-known but extensive region, deals also to some extent with its ethnology. A fourth memoir bears the title "Zur Morphologie und Biologie einiger Blätter und belaubter Sprosse," and is extracted from the twenty-fifth volume of the serial quoted above. This treats of the adaptation of certain South American plants to their surroundings, including the curious several-faced leaves ("folia tabulata") of certain *Iridaceæ* (*Alophia*, *Cypella*), the form and direction of the leaves and shoots of plants growing in the forest-glades, resupination of leaves with the result of placing them in the most favourable position towards incident light, and the form and direction of the leaves of climbing plants (hanging position, cordate shape, well-pronounced points for carrying off rain-water).

These constitute a series of excellent efforts, and the working out of Dr. Lindman's phanerogams will, we think, leave no doubt that the Regnell Expedition of 1892–4 is to be considered as one of the most successful botanical missions of the century just closed.

Under the superintendence of Mr. B. T. Galloway, the U.S. Department of Agriculture is continually issuing papers which are of great economic value as well as of interest from a purely scientific standpoint. A recent Bulletin, No. 21, deals with the fungi that are the cause of the white and red rot of red cedar trees. So great is the damage done by these fungi, that one dealer estimated that at least sixty per cent. of the trees in his locality were more or less injured and the wood rendered unfit for lumber. Mr. Herbert Schrenk, the author of this Bulletin, gives us the result of his careful study of the diseases. He considers that the hyphæ of the fungi enter the trunk by a dead branch, and penetrate to the centre of the tree, the heart-wood being gradually destroyed. The fruiting body of the fungus causing white rot has only been found twice; it belongs to the genus *Polyporus*, and is more or less hoof-shaped, very hard and woody, and somewhat yellow-brown in colour; it grows on the outside of the trunk. Mr. Schrenk has named it *Polyporus juniperinus*, though he thinks it may possibly be found to be a form of *P. fomentarius*. Red rot is caused by a form of *Polyporus carneus*, and the mature fungus is usually found in the depression of the trunk where a dead branch has broken off. Mr. Schrenk gives an instructive series of plates showing the damage done to the wood, and he concludes by stating some methods of combating the pests.—A. L. S.

Mr. Ernest S. Salmon publishes, in the Memoirs of the Torrey Botanical Club (4 Oct.), *A Monograph of the Erysiphaceæ*. It occupies 292 pages, and is illustrated by nine plates.

Mr. J. M. B. Taylor, who is good enough to express his pleasure at our publication of his letter on p. 456, will publish early in 1901 a "Botanist's Guide to Renfrewshire." "This work will be a guide to the Flora of Renfrewshire, dealing with the peculiarities of the native plants, trees, shrubs, grasses, ferns, &c., their habitats, time of flowering, &c.," and we look forward to it with interest.

The latest fascicle (vol. ii. fasc. 2, 20 Oct.) of *Symbolæ Antillanæ* contains the conclusion of Mr. Clarke's *Cyperaceæ* (to which Dr. Urban adds a supplement); a monograph of the *Acanthaceæ*, by Dr. Lindau; descriptions of new *Lauraceæ* and *Bromeliaceæ* by Dr. Mez; and a large number of new *Leguminosæ* by Dr. Urban, who incidentally describes new species from Mexico. A new genus—*Hebestigma*—is established on *Robinia ? cubensis* H. B. K. (*Gliricidia platycarpa* Griseb.).

At the meeting of the Linnean Society held on Nov. 1st, the President, Prof. S. H. Vines, in the chair, Mr. J. E. S. Moore read a paper on the character and origin of the "Park-lands" in Central Africa, which was illustrated by a series of lantern-slides. These park-lands in the Tanganyika district have quite the appearance of

having been formed by the hand of man, but are really natural growths, due to the fact that light surface-soil has been laid down over what appear to have been lake-deposits. Any given line of country will show large plantations, with quite a home-like look, separated by grass-lands; and, as Tanganyika is approached, they dwindle in size till they consist of a few shrubs, overshadowed by giant Euphorbias, cactus-like in appearance. Then come stretches of grass, dotted with Euphorbias, and, last of all, the salt steppes by the lake, which is now held to have had at one time an outlet to the sea. Mr. Moore's explanation is that at first only the Euphorbias would grow on the salt steppes; but as these sprang up they afforded a shade and shelter to self-sown shrubs, each of which, as it established a footing, contributed to the natural planting of the area by the distribution of the seeds, till this process reached its highest development in the large plantations where the shrubs overtopped the Euphorbias to which they owed their growth.

We ventured last year to comment on the irrelevant details introduced into the biographical notices published in the *Proceedings of the Linnean Society*, and the part just issued seems to justify a repetition of our strictures. In one case, six lines are devoted to the connection of a Fellow with the local Rifle Volunteers; he was also a freemason of long standing, and an angler. This gentleman, however, did work which justifies his inclusion in the biographies of a learned society; but as much cannot be said for the Fellow whose claims to distinction, apart from his proprietorship of a preparatory school, rest on his cultivation of single Dahlias, and his success in showing them. "His first hobby in gardening was the Rose, but he relinquished it in favour of a flower which came into perfection at a period of the year when he could devote more time to it."

Prof. Delpino publishes, in the Memoirs of the Accademia delle Scienze dell' Istituto di Bologna, a very interesting "Comparazione biologica di due flore estreme artica ed antartica," of which we may give some account at a later date.

We are glad to learn that Mr. Fraser Robinson and others are steadily working at a Flora of the East Riding of Yorkshire.

Mr. I. H. Burkill is leaving the Kew Herbarium for Calcutta, where he will act as assistant to Dr. Watt, whom he will ultimately succeed. Mr. Burkill leaves England in January.

Vol. xvi. of the *Acta Horti Petropolitana* is occupied by an enumeration of the plants collected in the Caucasus in 1890 by Drs. S. Sommier and E. Levier. It forms a volume of 586 pages, and is illustrated by forty-nine excellent plates, representing the more interesting of the new species described. In vols. xvii. and xviii. of the same Acta, M. J. Palibin gives a "Conspectus Floræ Koreæ," extending to Salicaceæ, and illustrated by four plates.

The inaccuracy in dating publications, to which we have frequently called attention, still continues. A new and important work, to which we may return later—*Die Flora der Deutschen*

Schutzebiete in der Südsee, by Drs. Karl Schumann and Karl Lauterbach—is dated 1901 on the cover and on the title-page, although it was received at the Department of Botany on Nov. 17. The fourth edition of Prof. E. Macé's *Traité pratique de Bactériologie*, bears on its title-page the date "1901"! it was received in this country in October.

It is not often that we have to record the conferring of the highest civic honour upon a British botanist, but it is our pleasant duty to congratulate Mr. G. C. Druce on his election as Mayor of Oxford. We are indebted to an unknown friend for a copy of the *Oxford Chronicle* for Nov. 16, in which a full account of the proceedings is given. After paying a high tribute to Mr. Druce's civic virtues, Mr. Alderman Saunders, in proposing his election, said he "did not think they were all acquainted with Mr. Druce's position in the outside world. If they would permit him, he would read a short extract from *Who's Who*. There they saw that George Claridge Druce was apprenticed to a firm of pharmaceutical chemists, and afterwards he became President of the Northampton Pharmaceutical Society, Secretary of the Northampton Natural History Society, and, he believed, he was the founder of that Society. Also, he was a member for ten years of the Board of Examiners of the Pharmaceutical Society of Great Britain. He founded the Oxfordshire Natural History Society, of which he was president for two years, and its treasurer since its institution. He was, he believed, Chairman of the Pharmaceutical Conference, which would be held this year in Dublin. So they saw Mr. Druce's reputation extended far beyond the limits of Oxford. He was also an author of no mean power. He had produced a work on Flora (*sic*), and the University authorities, for his researches and erudition in that direction, conferred upon him the honorary degree of Master of Arts."

We are glad to infer from a reference to "Rolfe in Kew Bulletin 1900, ined." which appears under *Dendrobium inæquale* in the November issue of the *Botanical Magazine*, that our little contemporary's suspended animation will be restored before the close of the century. The year's issue at present consists of four appendices, but nothing has appeared of the volume to which they are presumably supposed to be appended; and the *Bulletin* for 1899 is still incomplete.

Among several papers which the pressure on our space has not permitted us to notice may be mentioned that on "Hybridization viewed from the standpoint of Systematic Botany," which Mr. R. A. Rolfe contributed to the "Hybrid Conference" held in July, 1899, by the Horticultural Society, and of which we received a copy reprinted from the Report of the Conference issued by the Society in April last. The paper contains a vast amount of information brought together from various sources. The following extract, bearing upon the controversy as to hybridity in *Epilobium* carried on in this Journal for 1891–2 by Messrs. E. S. Marshall and C. B. Clarke, will be read with interest:—"One of these very plants

[*E. roseum*] had long previously been raised artificially, though none of the authors mentioned seems to have been aware of the fact. Sir James E. Smith, in 1800, had remarked concerning *Epilobium roseum:* 'Is it possible it may have originated from seeds of the latter [*E. tetragonum*] impregnated by the pollen of *E. montanum?*' [*Engl. Bot.* x. t. 693). In order to test this suggestion Dr. Bell-Salter, about the year 1842, fertilized *E. tetragonum* with pollen of *E. montanum;* seeds were readily produced, and hybrids obtained, which were described as intermediate between the parents, but different from *E. roseum.* He then reversed the cross, but the progeny proved indistinguishable, These hybrids were raised true from seed for four successive years, and up to the date of his writing (1852) plants continued to make their appearance (*Phytologist*, iv. p. 379). The result of this experiment was doubly interesting, for not only is *E. roseum* now recognized as a common and widely diffused species, but the hybrid has also long been known in a wild state. According to Haussknecht, it was described as long ago as 1831 by Lasch under the name of *E. subtetragono-montanum* (*Linnæa*, vi. p. 495), and Celakovsky, in 1881, as *E. Freynii* (*Prodr. Fl. Bohem.*, p. 881). It is found in several different localities where its parents grow intermixed."

The latest issue of the Transactions of the Perthshire Society of Natural Science (vol. iii. part 2) contains a paper on the alpine flora of Clova, by Miss M. Thomas, and the conclusion of the admirable paper on "Plant Associations of the Tay Basin," by the late Robert Smith, of whom we hope to say more later; it is accompanied by an excellent map and a portrait of the author.

The second instalment of *Das Pflanzenreich* contains the *Typhaceæ* and *Sparganiaceæ*, by Dr. P. Graebner.

We have received the first part of what seems likely to be an important work on Cactaceæ—*Blühende Kakteen*—which Mr. Neumann of Neudamm is publishing. It is edited by the indefatigable Dr. K. Schumann, who describes a new species—*Echinocactus Anisitssi.* Each instalment is to contain four quarto coloured plates—those in the present number are excellent—at the cost of four marks. The book will be useful both to botanists and horticulturists.

The Botanical Department of the British Museum has lately acquired M. Bescherelle's herbarium of exotic Musci and Hepaticæ. It consists of 14,800 specimens of Musci and 3500 specimens of Hepaticæ. It contains the types of the many species described by Bescherelle, and a large number of specimens collected in the French Colonies during the last thirty years, as well as collections made in the islands of Amsterdam and St. Paul, in Brazil, Paraguay, Tahiti, Japan, Mexico, and the Marquise Islands, which were described by Bescherelle. There are also numerous authentic specimens from older workers, such as Schimper and Montagne, and from the older French explorers, such as Bory de St. Vincent, D'Orbigny, D'Urville, and Du Petit Thouars.

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